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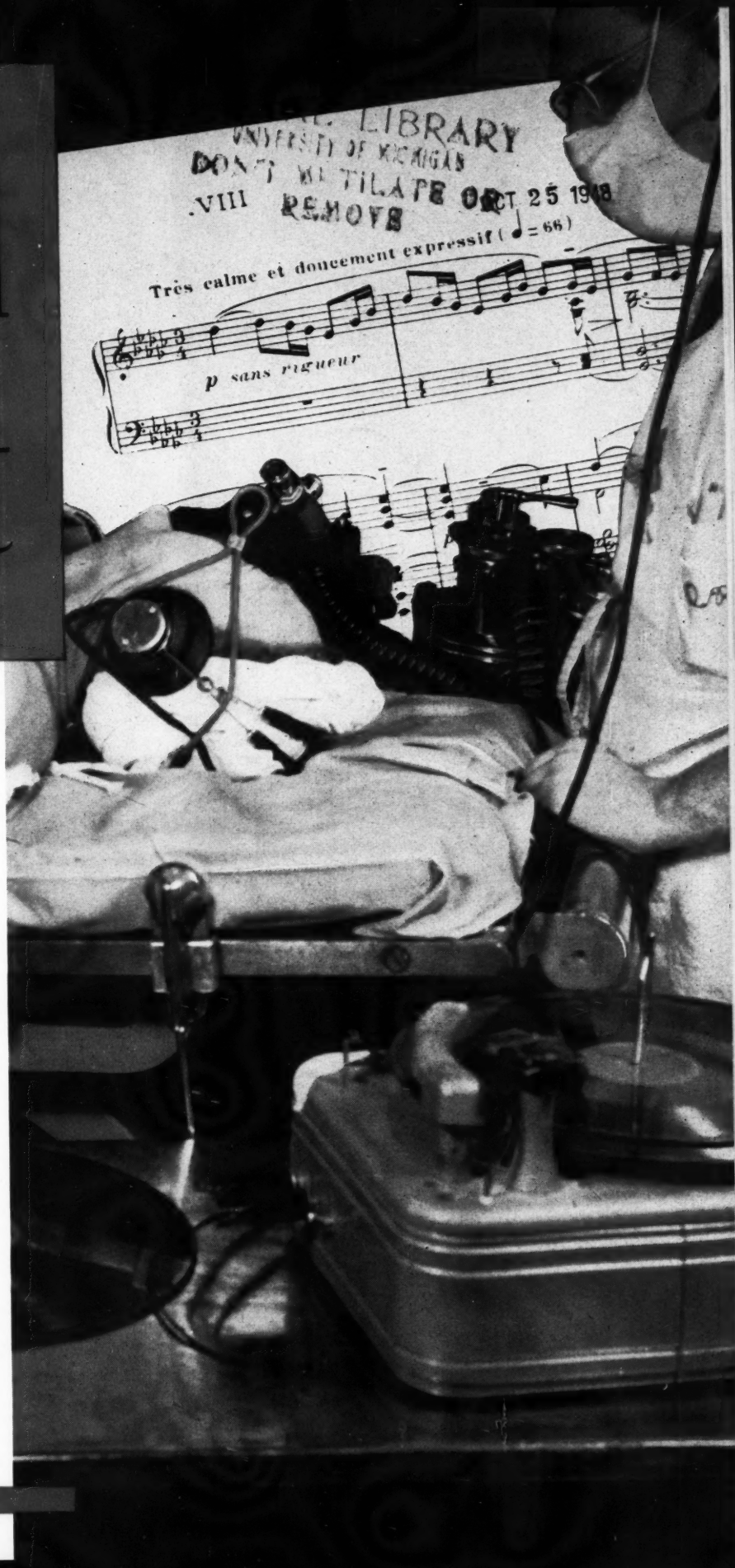

October 1948

IN THIS ISSUE

Planning and Designing Removable Partial Dentures 444

Further Applications of Fiberglas in Dentistry 451

Acute Glossitis 454

Music as a Supplement in Dental Nitrous Oxide-Oxygen Anesthesia 455

Clinical and Laboratory Suggestions 458

The Editor's Page 460

Medicine and the Biologic Sciences 461

Contra-Angles 468

(A Complete Table of Contents Appears on Page 443)

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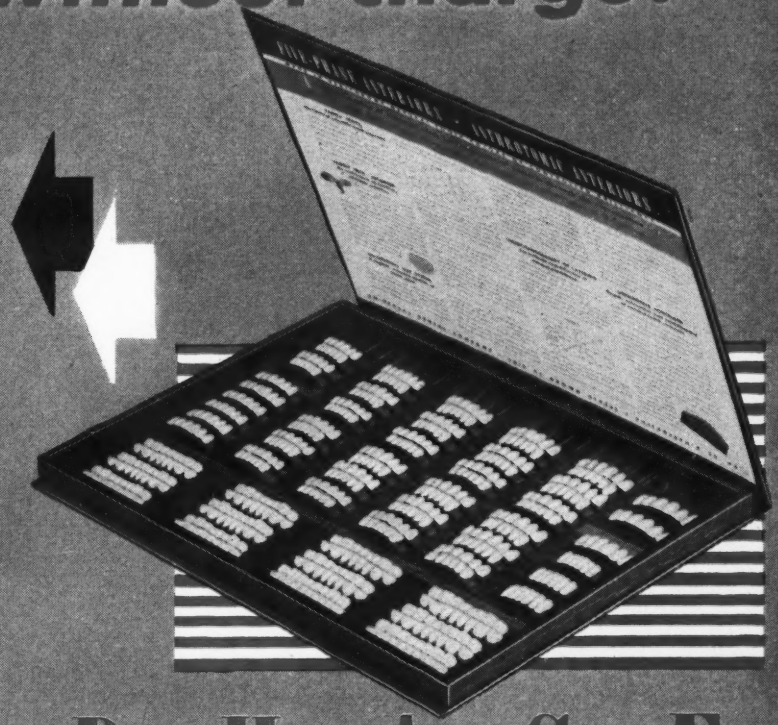

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Vol. 54, No. 10

Dental Digest

OCTOBER 1948

Planning and Designing Removable Partial Dentures
A. H. Schmidt, D.D.S. 444

Further Applications of Fiberglas in Dentistry
Harry Maeth, D.D.S. 451

Acute Glossitis (An Abstract) 454

Music as a Supplement in Dental Nitrous Oxide-Oxygen Anesthesia
Harry Cherry, D.D.S. and Irving M. Pallin, M.D. 455

Clinical and Laboratory Suggestions 458

1. Dental Bracket Table Receptacle. 2. Adding Wax to an Upper Inlay Pattern. 3. Applying Cavity Lining. 4. A Method of Cleaning the Arms and the Pulleys on the Dental Engine. 5. Checking Occlusion on Direct Patterns. 6. Protection of Ampules and Dispensing Tubes.

The Editor's Page 460

Contra-Angles 468

Medicine and the Biologic Sciences 461

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HARRY MAETH, D.D.S., (Columbia University, 1925) has been a regular contributor to DENTAL DIGEST since 1944. He has been conducting original research in dental applications of Fiberglas since 1945 when his preliminary report was published in DIGEST. In this issue Doctor Maeth presents his second progress report, FURTHER APPLICATIONS OF FIBERGLAS IN DENTISTRY.

HARRY CHERRY, D.D.S., (New York University Dental College, 1918) has collaborated with Doctor Irving M. Pallin in the writing of his article, MUSIC AS A SUPPLEMENT IN DENTAL NITROUS OXIDE-OXYGEN ANESTHESIA. Doctor Cherry has been a member of the oral surgery staff of the Brooklyn Jewish Hospital over twenty-two years and has been using the technique he describes for the last five years.

EDWARD J. RYAN, B.S., D.D.S., Editor
708 Church Street, Evanston, Illinois

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Planning and Designing *Removable* PARTIAL DENTURES

A. H. SCHMIDT, D.D.S., Lincoln, Nebraska

DIGEST

This is the first in a series of four articles on partial denture design and construction. The other installments will follow in successive months.

Five primary principles that cover the biologic and mechanical aspects of partial denture prosthesis are discussed.

The illustrations explain the three fundamental survey lines and the clasp indicated for each type of line. The three basic clasps, the combination clasps, and the modification of the common cast clasp are illustrated.

THE FIELD OF partial denture construction presents numerous complicated problems that have challenged the ingenuity of some of the finest minds in dentistry. Many outstanding dentists have devoted their best talents to the study and solution of these problems and have contributed materially to the progress that has been made in this field.

On the whole, this progress has been empiric rather than scientific. Partial denture construction does not readily lend itself to scientific methods of study. There are many reasons for this: the infinite variety of patients; their different states of health; the multitudinous methods of treatment and construction available; the length of time needed, usually years of periodic observation, before scientific conclusions can be drawn. Likewise, there remains the difficulty, if not impossibility, of obtaining an adequate number of control cases to check the results of one method of treatment against those of other methods. All these factors combined seem to preclude the likelihood of obtaining data based on scientific methods of study, comparable with those commonly employed in other fields of dentistry. While some scientific work has been done on partial dentures, this has been the exception. When success is measured by our ability to make restorations which function over a period of ten or more years, without damage to the remaining teeth and their investing tissues, it must be clear that our work is based upon practical rather than truly scientific methods.

This explains why we have, with few exceptions, improved our work through the trial and error method, as the result of clinical experience gained in daily practice.

The laboratory technician's responsibility begins and ends with fitting a denture to a master cast made from an impression taken by a dentist, and articulating the denture according to an occlusal registration furnished by the dentist.

Yet this limited responsibility does not mean that the laboratory technician should have no concern for the interests of his clients or for dental health service to the public. On the contrary, he should spare no effort to acquire knowledge of the biologic factors involved in restorative dentistry, and he should strive for a complete understanding of the principles of case design.

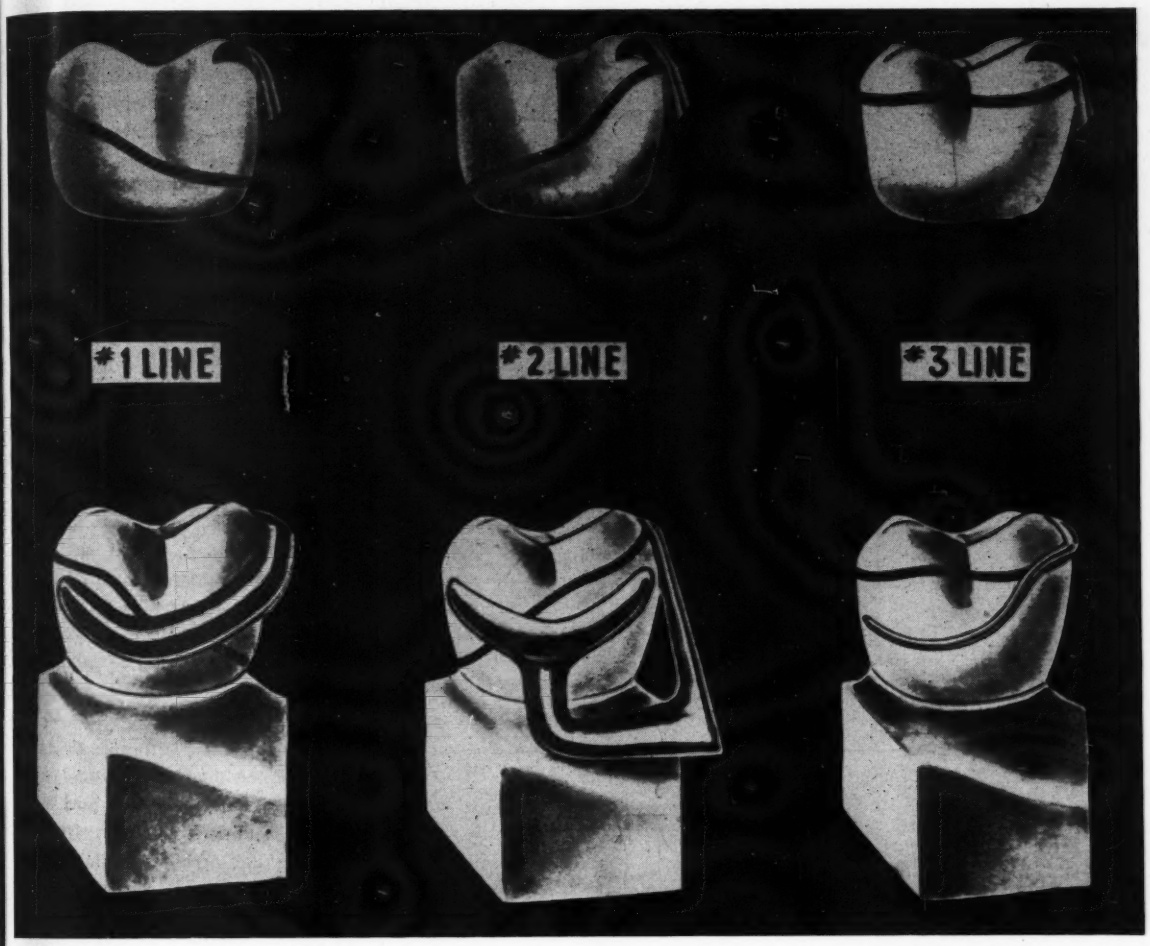
I hope to present principles which we consider basic or fundamental in partial denture prosthesis. The basic principles will include mechanical and biologic subjects. These concepts are grouped into five primary principles:

1. Dentists must have a working knowledge of both the mechanical and the biologic factors involved in partial denture design and construction.
2. Any plan of restoration must be based upon a complete examination and diagnosis of the individual case.
3. The dentist, not a technician, should correlate the pertinent factors and recommend a proper plan of treatment.
4. A partial denture should restore form and function without injury to tissue.
5. A partial denture is a form of treatment, not a cure.

Principle One

In order that he may render adequate partial denture service, the dentist must have a knowledge of the various basic sciences involved; anatomy, histology, pathology, physiology, and biochemistry. He must have a working knowledge of many of the laws of physics and engineering, particularly those which apply to levers and leverage. He must have a knowledge of dental materials. New scientific advances from both biologic and

The author expresses appreciation to George A. Hughes, D.D.S., Oakland, California for the *Basic Principles of Partial Denture Prosthesis;* and for the many helpful suggestions and illustrations obtained through The J. M. Ney Company of Hartford, Connecticut, and the Research Laboratories, Westinghouse Electric and Manufacturing Company, Pittsburgh, Pennsylvania.



1. ***All abutments should have occlusal rests positioned on the teeth in such a manner that the supporting load of each rest is at right angles to the long axis of the clasped tooth. The position of the occlusal rest in relation to the surveyed line determines the type of survey line.***

mechanical aspects are constantly being developed. A better understanding of our problem, in the light of increased knowledge and the use of improved materials, makes prosthesis an everchanging study. Here we have one of the primary differences between a profession and a trade.

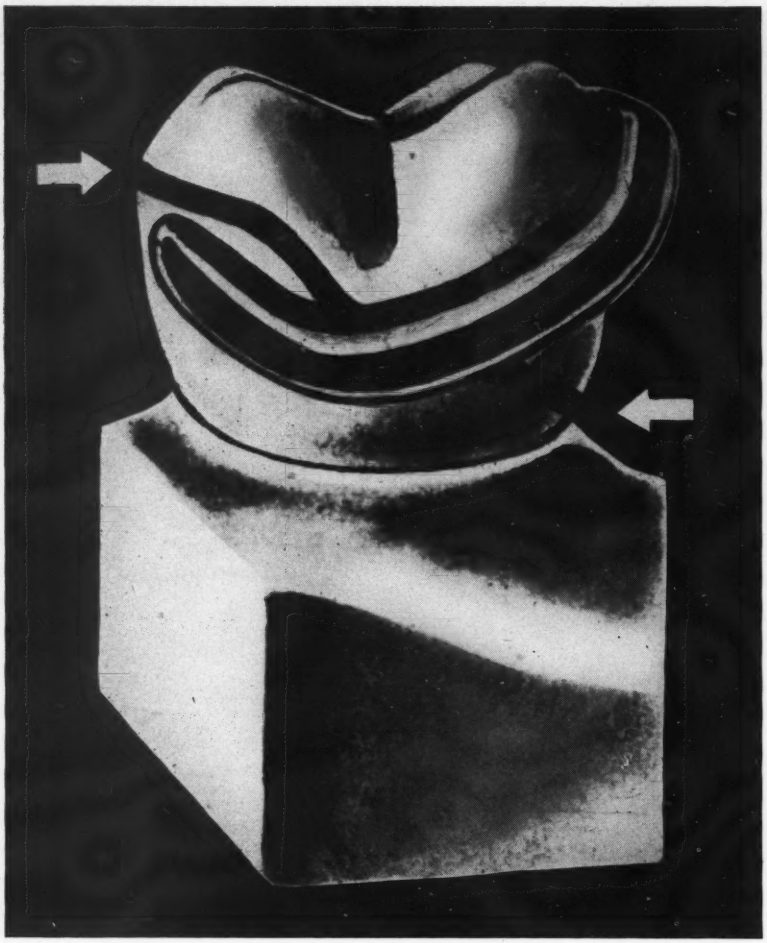
The tradesman serves his time as an apprentice and spends the rest of his life performing that which he has learned. The professional man in his college years receives a foundation and the privilege and opportunity to continue to learn. Because the individual, alone, can not gain the experience that it is possible to gain by a constant interchange of the experiences of large groups, study clubs and societies for this purpose were formed early in the life of our profession. More dentists should avail themselves of these opportunities. Too many dentists practice dentistry as though it were a trade.

If partial denture prosthesis is to be adequately practiced, the dentists engaged in making such restorations must have a knowledge of the biologic and mechanical factors and must continuously augment this knowledge. The partial denture is more than a piece of technique fabricated from various metallic and nonmetallic substances. It is, or it should be, a type of treatment. As any other treatment, whether it is intended for the mouth of the patient or for any other part of the human organism, it should be planned in accordance with the conditions of the particular case; it should be individualized.

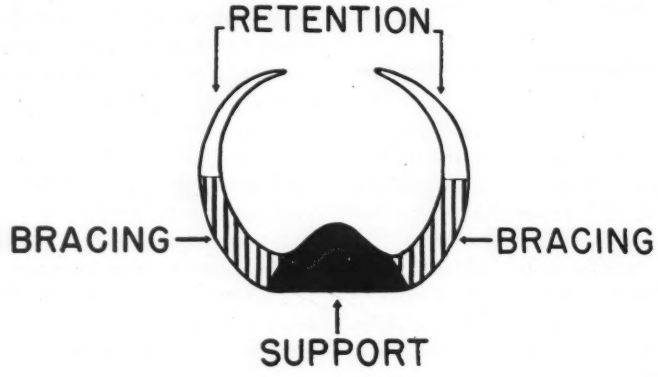
Principle Two

A complete examination and diagnosis must be made before a partial denture can be designed. It is not sufficient merely to look into a patient's mouth and see that there are missing teeth. An appliance which may render good service for one patient might be contraindicated for another, even though at first glance the cases may seem to be similar.

An examination for prosthesis must be more comprehensive than is generally undertaken. We should know as much as possible about the mouth of the patient, and in most cases we should also know something of the general health of the subject. It is required that we know something of the bone structure of the patient. It is essential that we know something of his eating and hygienic



2. *The #1 line is the surveyed line that appears low near the gingiva on the same side of the tooth as the occlusal rest preparation, slanting upward to its high point on the opposite side.*



3. *The #1 line calls for the #1 or Akers-type clasp—and, where it can be used, provides support because of its occlusal rest at the rigid portion of the clasp above the surveyed line. Retention is provided by flexible clasp arms in the undercut area; bracing by rigid body portion of the clasp over the non-undercut part of the tooth.*

habits. An examination with roentgenograms is a "must" for even the most simple partial denture restoration. Study models, either mounted or unmounted, are desirable—except in the more simple types of cases. An adequate examination is composed of both objective and subjective phases. The objective approach covering those things which we may see and feel and the subjective phase delving into those things which we must gain from memory or the opinion of the patient.

Many dentists may feel that the time spent making such an examination is largely wasted. Such belief is short-sighted and poor economy. One case failure due to an improper plan of treatment based on an inadequate examination and diagnosis would waste more time than would be used in many hours of consultation and examination.

Principle Three

The third basic principle as stated, was that the dentist should plan the treatment of partial denture cases himself. I do not wish to belittle the place of the dental technician as a trained auxiliary health service worker. His training and the information provided him regarding a case will enable the technician to fabricate raw materials into a finished partial denture. In this phase of the work he frequently becomes more skilled than the dentist because of constant technical practice. However, the fabrication of the appliance is but one phase of the problem. The treatment of a case requires much more than a knowledge of mechanical factors and technical ability.

The dentist may observe the pertinent facts, regarding any case, by an examination. It is frequently necessary to institute preparatory or corrective procedures prior to the construction of a restorative appliance. Contours of teeth may require modification, occlusal relations may require improvements, or surgical procedures may be necessary. The patient will accept such corrective procedures with much better grace if he is informed of the necessity of an adequate examination and diag-

nosis prior to the construction of an appliance. As the dentist alone may modify the conditions present in the mouth in order to influence the success of the case, he, not the technician, should plan the treatment.

Principle Four

In the fourth basic principle it was stated that a partial denture should not injure remaining teeth or adjacent structures. It is essential to plan or design the restoration in accordance with biologic laws governing the reactions of tissue. Sound principles of mechanics must also be followed in order that the appliance will function without undue alteration. The appliance must be carefully fabricated so that it will go to place without modification of the adjacent structures. The casts used in the fabrication of partial dentures must be made from impressions which faithfully record the oral tissues.

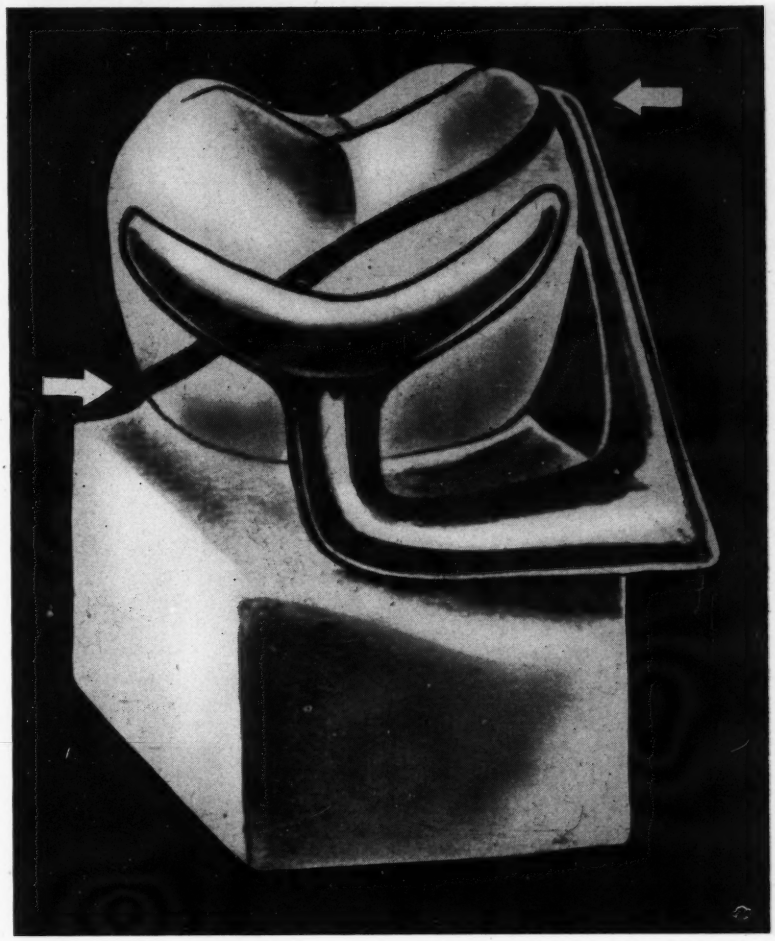
The functions of a partial denture are: The restoration and preservation of occlusion impaired by loss of teeth; the restoration and preservation of occlusion impaired by malposition of remaining teeth; the preservation of the remaining teeth and alveolar ridges; the restoration of a normal or desirable facial expression impaired by loss of teeth or closure of the bite.

A partial denture must be planned and constructed to fulfill these essential purposes with a minimum amount of interference to the tongue or enunciation and the least possible display of structural materials.

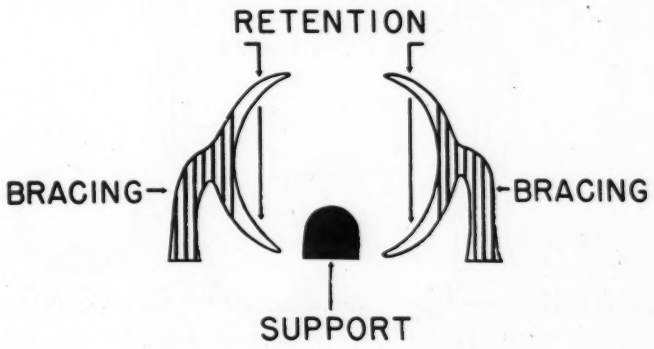
The various parts of the base must be designed to provide an adequate mechanical counter-balance or resistance to the differently directed forces or movements without interfering with any of the functions of a partial denture.

Saddles are supporting elements, one of their functions being to resist vertical masticatory pressure against the alveolar ridges. These flanges, resting against the lingual, buccal, or labial sides of alveolar ridges, may provide bracing support against horizontal, lateral, or anteric-posterior displacements.

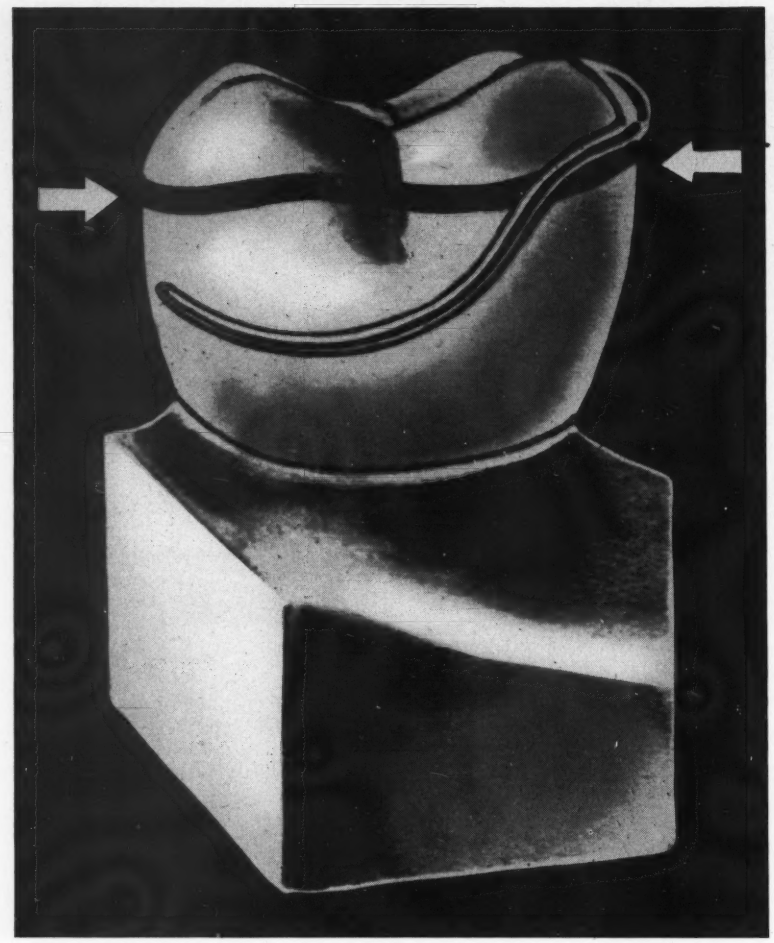
The stress of mastication must be



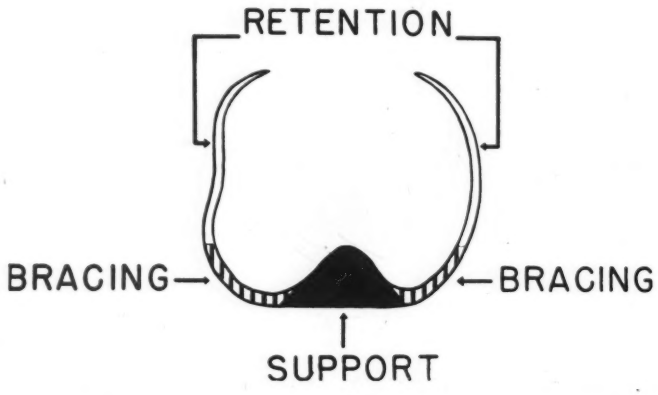
4. ***The #2 line is the surveyed line that appears high at the occlusal rest area of the tooth, and low on the opposite side. This is the reverse of the #1 line and, correspondingly, the undercut conditions are reversed.***



5. ***The #2 line indicates the #2 or Roach-type clasp. The #2 clasp provides excellent support and retention, but lacks the bracing advantages of the #1 owing to the flexibility of the clasp arms which are joined to the saddle and are of considerable length. The #2 clasp can be used on either the #2 or the #1 line.***



6. *The #3 line is the surveyed line appearing high on the crown of the tooth at the occlusal rest area and continuing high all around the tooth. This indicates the use of the #3 or wire clasp.*



7. *The unusual undercuts presented by the #3 line indicate the #3, or wire clasp, because of the extreme flexibility of wire alloys. This clasp provides support and retention, but very little bracing.*

resisted by an adequate support. Where possible, tooth-borne support should be employed. Where tooth-borne support cannot be utilized, the size of the saddle must be increased in proportion to the stress exerted upon it. Where the size of the saddle cannot be increased sufficiently, the occlusal stress must be reduced in order that a satisfactory relation between pressure exerted and ability to resist such pressure is attained.

Partial dentures which depend upon mucosa for support must not transmit this stress other than in a rootwise vertical direction to the abutment teeth. When the denture is displaced due to compression forces occasioned by the stress of mastication, torquing strain must not be transmitted into the abutment teeth. These strains and stresses must either be minimized or eliminated by proper design of the retainer or some sort of stress-breaking action must be provided.

Clasps are direct retainers whose function is to prevent the vertical dislodgement of the denture from its seat. Clasps may also serve as bracing supports to prevent the horizontal shifting of the denture or drifting or rotation of the teeth engaged by them.

Direct retention by clasps is provided only for the ends of the saddles to which they are attached. When no anchor teeth are available at the other ends, some means must be found to hold the saddles in their position against the ridges. This can be accomplished by extensions of the base to rest against the surfaces of teeth on the opposite side of an axial line between the clasps. Such parts of a denture are known as indirect retainers.

Indirect retention as well as direct retention should be provided in all distal extension cases in order to stabilize the appliance.

Major connectors, such as palatal, lingual, or labial bars, serve the purpose of joining posterior saddles with each other, or in unilateral cases to connect the posterior saddle with an anchorage on the side of the arch opposite the saddle. Among these connecting elements must be included all

the smaller bars or struts which are employed to join nearby saddles, or to support or reinforce clasps or indirect retainers.

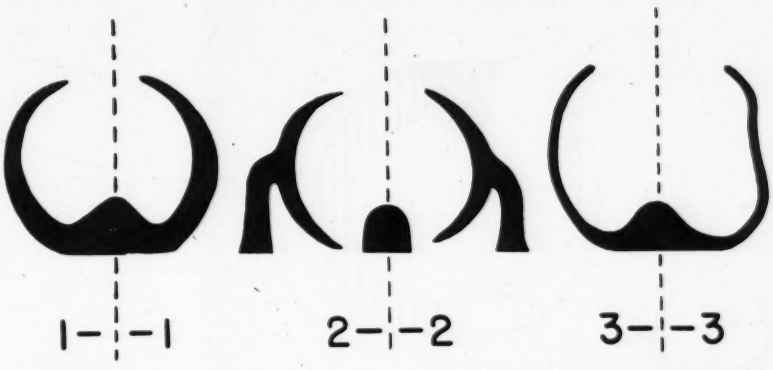
Lingual and palatal bars should be so located that they will neither interfere with the comfort nor the speech of the patient. Experience has shown us that the palatal bars should be located approximately in the same position as the distal border of a complete denture, crossing the palate distal to the second molars.

Independent lateral action of saddles should be prevented. The use of too light a lingual or palatal bar allows an independent action of saddles, rotating about the ridge crest as a center. The stress of mastication in causing this rotation places considerable pressure on the buccal and lingual peripheries of the saddle. Soreness in these areas may result and the dentist frequently is forced to trim away the saddle thus reducing the much needed support. Clinical experience has taught us that bars joining saddles, and lingual bars in particular, must be of sufficient strength to prevent torsion of saddles.

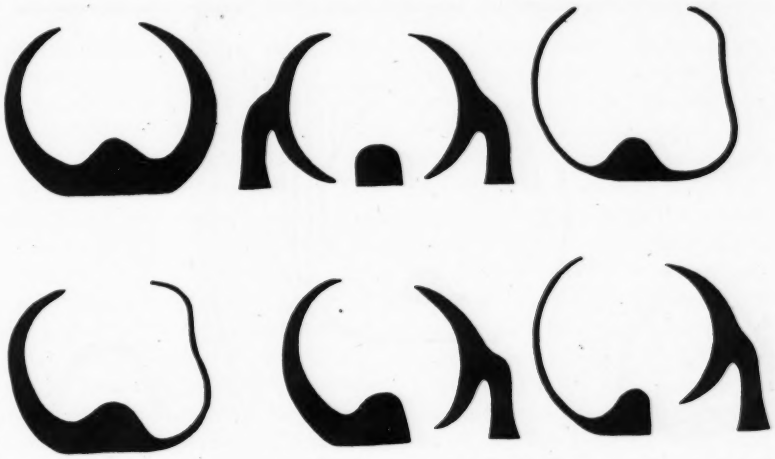
Stabilization is not merely a matter of vertical support and vertical retention. It is a problem of anchoring a denture—to prevent displacement from its functional position by forces which act upon it horizontally as well as vertically.

Tooth rests, sometimes called "stops" or "rest lugs," are intended to resist the movement of a denture by vertical masticatory pressure. In addition to vertical support of the denture in its functional position, they also serve the following purposes: They are an important aid to the retentive capacity of clasps, by helping to keep the clasp terminals in their proper positions; they prevent impingement of the cervical edges of clasps against the gingival margins of anchor teeth; they prevent the impingement of the extremities of saddles against tissues adjacent to the gingival margins.

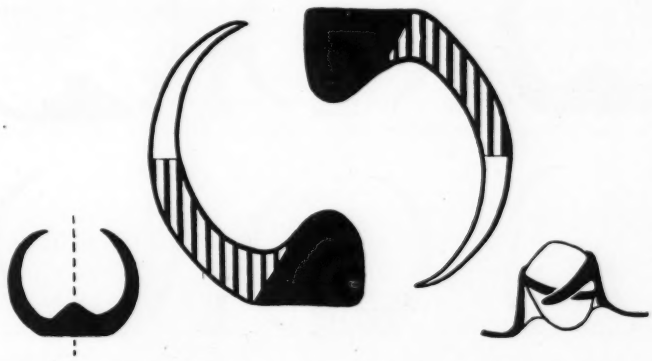
Each tooth adjacent to an edentulous area should carry a tooth rest, whether it is clasped or not. As direct retainers, clasps secure against vertical displacement those parts of den-



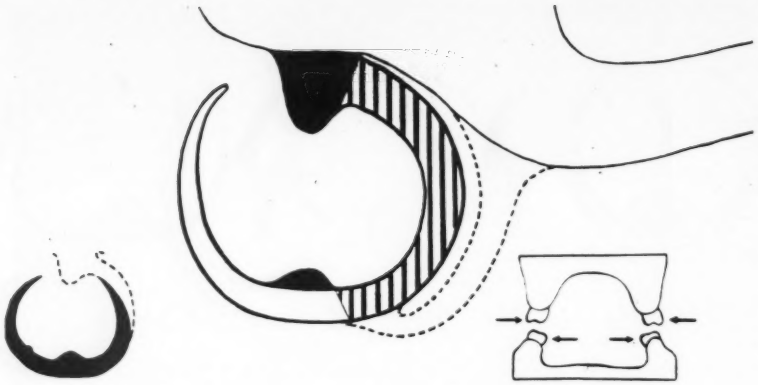
8. *The three fundamental or basic clasps would be described bucco-lingually as the One and One; Two and Two; Three and Three.*



9. *In the top row are the three basic clasps, the One and One; Two and Two; Three and Three. The bottom row shows the three combinations of the basic clasps, the One and Three; One and Two; Three and Two.*



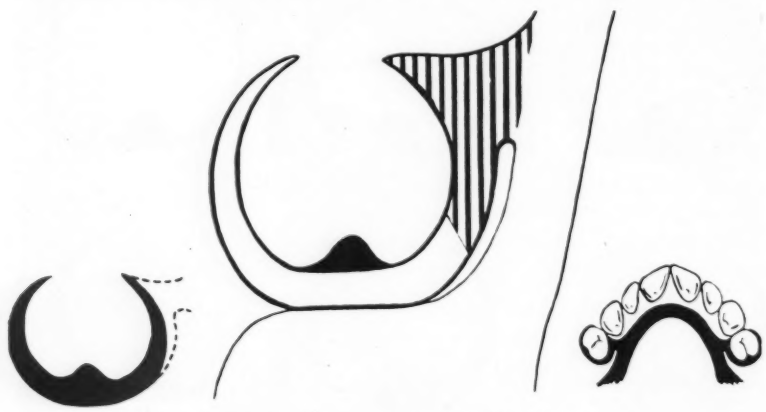
10. *The Half and Half clasp is a modification of the #1 clasp. It is generally indicated for bicuspids that stand alone in the arch with teeth to be supplied both anteriorly and posteriorly. Such an abutment is often badly rotated on account of its isolated position, and the Half and Half clasp is well adapted to these conditions.*



RING CLASP

11. ***The Ring Clasp is a #1 modification having only one arm, which is extended to include a second occlusal rest and flexible end. It is indicated for upper or lower molars standing alone, with no teeth to be supplied posterior to them and having undercut areas on one side only.***

12. ***The Back-Action clasp is a #1 clasp with two definite changes: (A) it is heavy at one end and gradually tapers to the flexible end; (B) it is attached to the lingual or palatal bar at the heavy end of the clasp. It will provide retention on a tooth not only bucco-lingually, but mesio-distally as well.***

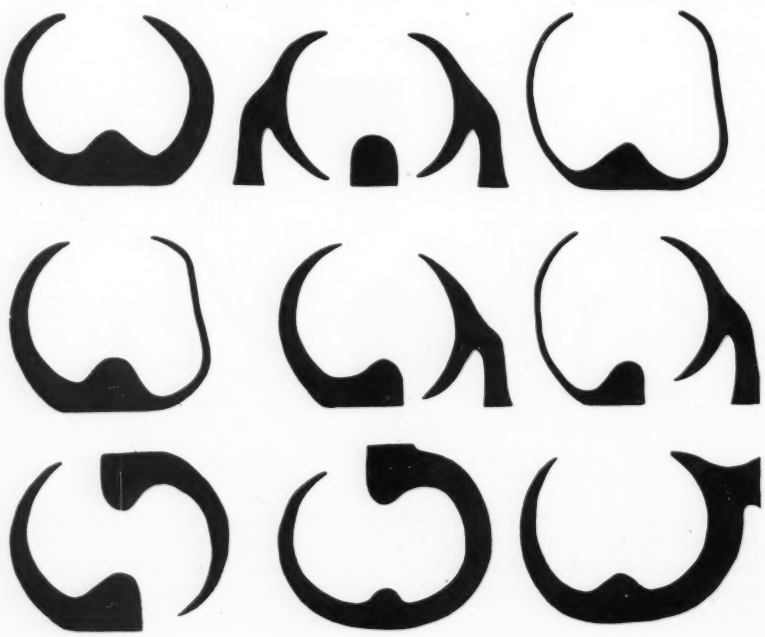


BACK ACTION

tures to which they are directly attached, and depend for their effectiveness upon two principal factors: 1. The contours of the crowns of the anchor teeth, or the angles at which they lean toward or away from each other; 2. The physical properties of the clasp metal. In order to provide retention, one or both of the terminals or arms of a clasp must be elastic enough to spread open and pass the opposing projections created by the contours of the anchor teeth, and then close about the undercut. The extent of this spreading, of course, is greatest at the free ends or terminals, gradually diminishing to nothing where the clasp is joined to the base of the denture. To locate these undercuts and determine the most favorable areas for retention, the master cast should be surveyed. Clasp guide lines should be charted with one of the surveying instruments now available. The guide line defines the limits of projection on the contour of the proposed anchor teeth and indicates the position of retention undercuts.

The position of the guide line and therefore of the clasps can be changed by varying the angle at which the

(*Continued on page* 454)



13. ***The nine clasps of the survey system. Each one has its definite place and function made possible by the use of the surveyor. Top row, basic clasps, numbers One, Two, and Three; in the center the combinations, One-Three, One-Two, and Three-Two; and the bottom row, the Half and Half, the Ring Clasp and the Back Action.***

Further Applications of FIBERGLAS *in Dentistry*

HARRY MAETH, D.D.S., Mosinee, Wisconsin

DIGEST

Fiberglas has proved to be a highly versatile, almost indefinitely adaptable, basic engineering material in the same sense that steel, copper and aluminum are basic engineering materials. This article is a continuation of the report of progress in the use of Fiberglas in dentistry with particular reference to its use under gold foil restorations and as a temporary filling material and base.

THE UNIQUE physical properties of Fiberglas and its ready adaptability in previously reported[1,2] dental applications has suggested its trial in other dental uses. Herein are enumerated the observations on the procedures and clinical findings of pure Fiberglas and the Fiberglas mass in dentistry.

Glass fibers possess the greatest tensile strength-weight ratio of any commercial material, natural or synthesized by man. Fibers averaging 23/100,000 of an inch in diameter have a tensile strength of more than 250,000 pounds per square inch. Experimental fibers have been produced with a diameter of 2/100,000 of an inch and with tensile strengths considerably higher.

The glass fibers possess remarkable dimensional and physical stability. At tension approaching breaking strength the fibers show an elongation up to 3 per cent. High tear-strength and dimensional stability, resistance to moisture, heat, chemicals or oil, are responsible for the utilization of glass fibers in dentistry.

Fiberglas Mass as a Temporary Filling Material and Base

The mixture is composed of zinc oxide, eugenol, white rosin, zinc acetate and Fiberglas in the hammer-milled form, 1/16 of an inch. The ingredients without the Fiberglas are first spatulated to a medium thick mass and then the Fiberglas is worked into this mixture. It will be noticed that at this stage the mixture becomes a little thinner as the Fiberglas is incorporated. To obtain the desired consistency more zinc oxide is added with more Fiberglas. The putty-like mass can easily be divided into any sized portions or small particles without shredding. The mass is placed into the tooth cavity and in a few minutes it sets into a dense filling.

This temporary filling material can be removed or shaped with excavators or with the bur. Burs number 700, 701, 556 and 557 may be used for making the step. Such a base or temporary filling is radiopaque and serves as a contrast medium when verifying the area for the presence of residual caries.

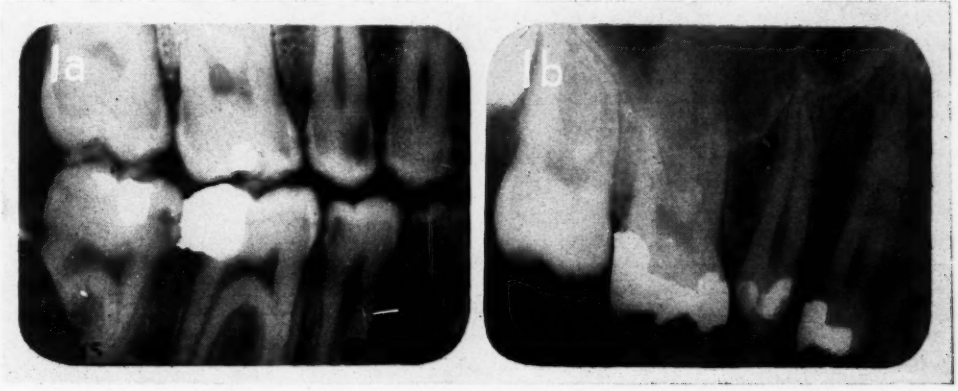
Capping Over Exposed Healthy Pulps

The ingredients for this mixture are the same as in the first, compounded to a medium thick mass. The portion of the material to be laid upon the pulpal wall contains no zinc ace-

Editor's Note: The photography of the specimens shown was made possible through the courtesy of Mr. Robert B. Taylor, Assistant Director of Research, Owens-Corning Fiberglas Corporation.

[1]Maeth, Harry: Fiberglas Used as a Root Canal Filling Material, Preliminary Report, DENTAL DIGEST 51:555-556 (October) 1945.

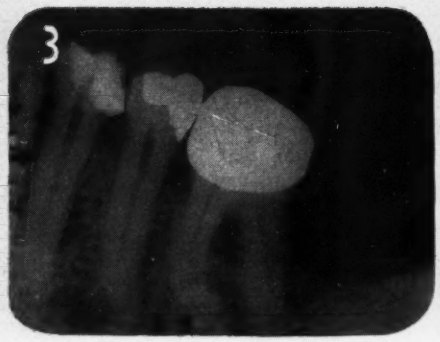
[2]Maeth, Harry: Fiberglas Used as a Root Canal Filling Material, Progress Report, DENTAL DIGEST 53:332-335 (July) 1947.



1a. *Extent of caries in maxillary second bicuspid.*

1b. *Caries removed. Fiberglas mass in position as base and contrast medium.*

2. *Fiberglas mass in position in a deep mandibular second molar cavity.*



3. *Fiberglas mass in position in a deep mandibular first bicuspid.*

4. *Fiberglas mass in position in a deep mandibular first molar and acting as a contrast medium to reveal some residual caries.*

tate. The amount of zinc acetate for the rest of the filling is limited to a maximum of 0.5 per cent for the solid portion. Even less than this amount of zinc acetate may be found to be effective in reducing the setting time.

The nonirritating effect, the high insulation value, and the great dimensional stability of the Fiberglas mass make it particularly adaptable in this application.

As a Base Under Gold Foil Restorations

Cervical cavities in upper and lower cuspids, upper central and lateral incisor teeth have been filled with pure Fiberglas bases and cohesive gold foil restorations (Figs. 7 and 8). Most of these cavities had contained defective silicate cement restorations and were also carious and sensitive to thermal changes.

Method—The pure Fiberglas is inserted into the prepared and isolated cavity with gold foil placing and condensing instruments. Upon the condensed layer of Fiberglas the cohesive gold foil is placed and condensed. Excess is easily removed. The cavity may be filled about one half with Fiberglas and then sealed with the cohesive gold foil. Some initial cavities opened and prepared with the number 33½ inverted cone bur have been treated in this manner.

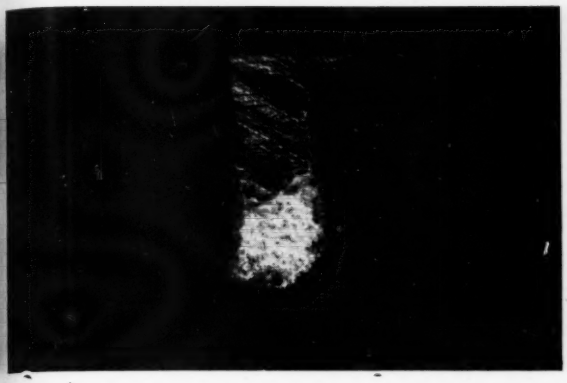
The Fiberglas for such a small base is much easier controlled for proper outline and shaping than is cement for the same purpose. The excess Fiberglas does not interfere with the cavity margins and no time is lost while working with it as might be during the removal of excess cement.

The color of the Fiberglas readily distinguishes it from the gold foil. This makes it easier to handle in the smaller areas. The condensed Fiberglas makes a rather compact mass. The high insulation value of the material reduces the effects of thermal changes in the sensitive cervical areas to an amount almost negative.

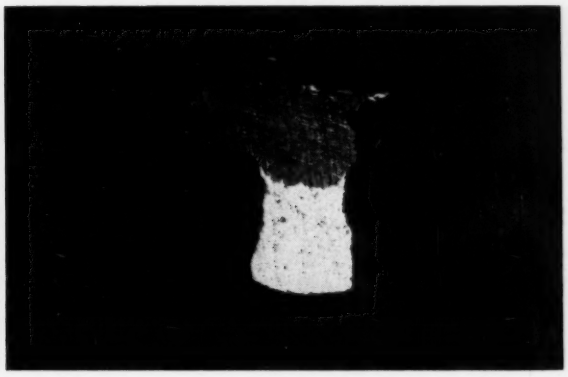
5. *Fiberglas mass in position as base in maxillary lateral incisor distal surface and cuspid mesial surface. These teeth were subsequently restored with silicate cement.*

6a. *Fiberglas mass in position as base under a cohesive gold foil restoration.*

6b. *Fiberglas mass base supporting a two-surface gold foil restoration.*



7. ***Section showing pure Fiberglas used as a base under a cohesive gold foil restoration. Magnification 25X.***



8. ***Section showing Fiberglas mass used as a base under a silver amalgam restoration. Magnification 25X.***

A Protecting Agent

After being treated with a water repellent, Fiberglas can be placed over cohesive gold foil in the container before the stopper or cork is inserted. It gives better protection than cotton wadding.

Instead of shreds of cotton the product can be used between compound, beeswax, or alginate impression material in impressions. The hammermilled form is applied to the softened wax or compound surface in a thin even layer. It will help to hold the alginate material in place.

For prepared abutments or teeth prepared for jacket crowns Fiberglas is useful as a cement. Occlusal force sets the mass in the copper tube or aluminum shell which has been fitted to the tooth. The excess is removed when hardened. The mass is mixed according to the directions given in the beginning of this article. It keeps the prepared tooth in a safe and comfortable condition until the crown or the attachment is finished and is easily removed with excavators and Morse scalers without disturbing the outline or form of the prepared tooth.

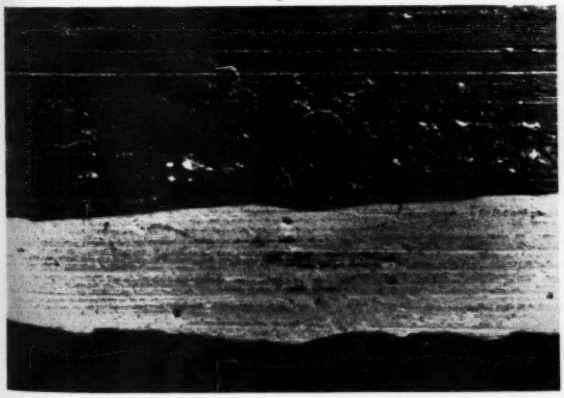
Summary

Wearing Qualities—The Fiberglas mass has been found to be a dependable temporary filling material. After five or six months some of the fillings were intact and apparently giving the patients good service. Considerable edge strength and wear resisting tendencies make such reinforced fillings useful in the treatment of certain cavities in deciduous teeth.

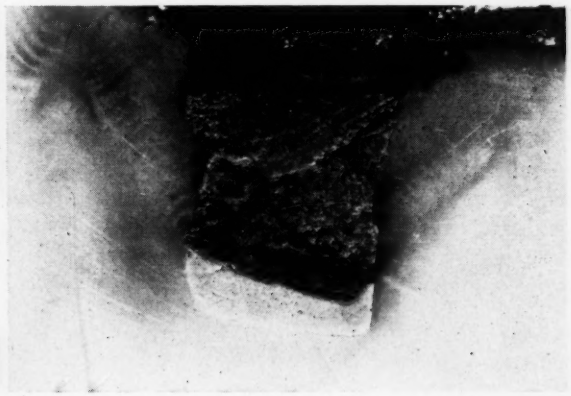
Increased Density—After the compound has set for a few days it appears to assume increased density. This becomes definitely noticeable when cutting with the bur is attempted. The bur makes a clean cut without impairing the general shape or bulk of the filling. Detailed angles and small undercuts become quite visible when developed. Bases for small proximal cavities to be restored with silicate materials are easily shaped up and can be traced in the roentgenogram. (Some damage to the Fiberglas mass and to the pure Fiberglas was incurred during the process of sectioning the specimens).

The substance seems to have a density closely comparable to that of dentine, as shown in the roentgenogram (Fig. 6b), of a cuspid tooth which holds a two-surface gold foil restoration placed upon a Fiberglas mass base.

Ease of Handling—There is nothing complicated about mixing the Fiberglas or manipulating the mass.



9. ***Section showing Fiberglass mass as a base under a silver amalgam foil restoration. Magnification 25X.***



10. ***Tooth section. Silver amalgam in crown and Fiberglas mass base. Magnification 25X.***

Some of the commonly used dental cements appear to offer greater difficulty in handling and shaping up after setting.

Toleration—In some cases of hypersensitive teeth ordinary dental cement was poorly tolerated as a base material under metal restorations. These were removed and replaced with Fiberglas mass. It was well tolerated; no further pain complaints were reported.

Ordinary zinc and copper dental cements may also be reinforced with Fiberglas. These mixtures must be manipulated more rapidly because of the quicker setting time of the dental cements.

Conclusion

It has been demonstrated that the great dimensional stability and the high insulation property of the material makes the utilization of Fiberglas of distinct value for the dental purposes described.

Planning and Designing Removable Partial Dentures

(*Continued from page* 450)

cast is tilted. The angle of the cast determines the path of insertion of the denture to make it easy to seat and remove from the mouth, in one direction only—a direction parallel to the vertical mandrel of the surveyor.

Principle Five

As a fifth basic principle it was stated that a partial denture may be considered a form of treatment but never a cure. Like a treatment it must be modified from time to time in order to suit changing conditions, whereas a cure would be considered a permanent correction of the condition. The partial denture itself is subject to wear and breakage. The oral tissues never remain the same but are constantly changing, hence the partial denture patient is one who must be subject to periodic recall in order to prevent or rectify deleterious changes which may take place. In the construction of a partial denture, simplicity should be a by-word. The more simple the appliance, the less likelihood of frequent adjustments and repair. The appliance should be so designed and constructed that it may be modified to compensate for changes in the thickness of mucosa or alveolar resorption.

The University of Nebraska
College of Dentistry

Acute Glossitis

Problem—A patient 50 years of age has had glossitis for the past year. The borders and the tip of his tongue are extremely sore and tender. The tongue is a beefy, fiery red along its anterior two-thirds, the edge more intensely red than the center.

Blood and urine are normal. Gastrointestinal findings by roentgen examination are normal. Gastric analysis shows a mild hypochlorhydria. His diet is adequate and he certainly does not have pernicious anemia or sprue.

Large doses of vitamins orally, including nicotinic acid, give no relief. Massive doses of vitamin B complex intravenously and intramuscularly fail completely to be useful. An attempt to maintain him on folic acid has not prevented recurrence. Liver is the only agent that has been even temporarily efficacious. Injection of 1 cubic centimeter of liver extract (10 units per cubic centimeter) gives relief within two to three hours; the inflammation and pain disappear and the tongue remains well for about three weeks. The symptoms then recur, apparently there is a failure to absorb an essential factor from the diet.

Discussion—The glossitis is apparently due to a deficiency, probably the lack of an unknown specific factor present in liver extract. Lack of any of several members of the vitamin B complex, of certain unidentified factors and even of iron may be responsible and have been demonstrated to clear the glossitis, as well as an associated anemia, when administered.

The chance that there is an absorption defect is remote, since the intestinal function, roentgenologic status and gastric acidity are normal. The acidity should be rechecked to be sure that the glossitis is not a preanemic occurrence.

Local irritants, smoking, dental abnormalities, mouth washes, irritant foods and alcoholic beverages should be excluded as potential causes. The effectiveness of liver extract and whole liver by oral administration should be investigated. (Nicotinamide should be given in 50 to 100 milligrams doses by mouth each day for three weeks.) Cirrhosis of the liver should not be ruled out and it should be made sure that the man's diet is actually adequate.

If all the points suggested prove to be without value, tell the patient that he has an unusual condition and that treatment and observation must be continued for an indefinite period.

—From *The Journal of the American Medical Association* 137:1566-1567 August 21) 1948.

MUSIC *as a Supplement*

in Dental Nitrous Oxide-Oxygen Anesthesia

HARRY CHERRY, D.D.S. and IRVING M. PALLIN, M.D., Brooklyn

DIGEST

A description of a technique in which music is used as a supplement to nitrous oxide-oxygen anesthesia.

FOR MANY YEARS the most popular general anesthetic in the dental profession has been nitrous oxide-oxygen. Its use has increased steadily although little reference has been made to the dangers inherent in it when the oxygen is reduced in an effort to increase the potency of the gas.

In dentistry the patient is ambulatory, apprehensive, and emotionally distressed. These factors intensify reflex irritability, thereby rendering nitrous oxide less potent. Not only is nitrous oxide made less effective but the tissues and the cells are stimulated. The demand for oxygen then becomes greater. It follows that a diminished oxygen supply necessarily creates a demand far out of proportion to a normal emotional state.

Editor's Note: Acknowledgment is made to *Anesthesiology* for permission to use this material which was first published in that magazine.

Objections to Premedication

1. The use of opiates, barbiturates or scopolamine as a means of lowering reflex irritability prolong the office visit time, an inconvenience to the dentist and patient. If the drugs are given sufficiently in advance the patient has to be brought by someone else or come at least an hour before the appointed time.

2. These drugs call for a lengthy postoperative recovery period. This also requires the assistance of an extra person, increased office space and adds to the loss of time.

3. Premedicants are habit forming. Most dental procedures require repeated visits so that addiction to these drugs could easily become established.

The Potent Agents

Many general anesthetic agents are not suited for use in the office because they come within the explosive range, are inflammable, or because they contribute to postanesthetic discomfort, vomiting, vertigo, and general malaise. Some of them present mechanical difficulties which must be taken into account. Procedure involving sodium pentothal, for instance, requires that an airtight positive pressure oxygen resuscitation machine be immediately available. A person thoroughly trained in the use of the equipment must be on duty.

Nerve block or conduction anesthesia of the maxillary or mandibular branches of the trigeminal nerve does away with many difficulties and is an ideal method where an unconscious state is not necessary.

Music as a Supplement to Nitrous Oxide

Equipment—The equipment used with the music technique included an ordinary electric record player with earphone transmission instead of the usual loudspeaker. The earphones had large cups for the purpose of excluding environmental sound, footsteps, the jingle and clash of instruments, conversation, and the opening and closing of doors.

Method—The patient was given a remote volume control and instructed how to use it to his maximum enjoyment. A microphone was interconnected with the record player so that the operator was able to speak to the

patient at any time. The patient could then follow necessary instructions without interfering with the assembled apparatus.

Selection of Music—The music found by experimentation to be most efficacious was mild, soothing, and dreamlike in character. A list of pieces played most often follows.

1. Claire de Lune .....Debussy
2. Moonlight Sonata...Beethoven
3. Dream Pantomime ..... Humperdinck
4. Evening Star .....Wagner
5. Forest Murmurs .....Wagner
6. Poeme .....Fibich

These selections are not offered arbitrarily but are suggested as examples of the kind of music found to be most desirable. It is safe to say, however, that the music the patient prefers is always suitable. That which proved to be most effective had a smooth even tone and contained no conflicting, harsh or startling instrumentation. Out of a series of more than 10,000 cases studied the records named were more frequently chosen and gave the most profound type of unconsciousness.

It was demonstrated that modern jazz, excitable or rapid tempo music were distinctly unsuited to the purpose. Muscle twitching swing music tended to produce an unwanted, sensitive to pain, uncooperative attitude.

The Anesthetic Machine—A Heidbrink, Foregger, or McKesson machine is approved. It should be equipped with nitrous oxide and oxygen yokes without carbon dioxide absorption and with the gases led by a rubber tube to a nose mask with an expiratory valve controlled by a light spring. The McKesson machine was used almost entirely during the experimental phase in this group of cases.

Four photographs showing the use of the music apparatus as a supplement to nitrous oxide anesthesia. The photographs were made in the operating rooms of the Jewish Hospital of Brooklyn.

Technique

After considerable experimentation a definite routine was established. This worked out more successfully as the experience of the operators increased. The routine, an important part of the technique, began at the moment the patient entered the waiting room and was received by the receptionist who had been trained to greet all patients warmly but to regard their dental disease casually.

All apparatus was kept out of sight or covered so that there were almost no exciting objects in view. The attitude of the operator to the patient was reassuring, cordial and positive. The vocabulary was firm and convincing. Such words as fear, afraid, pain, hurt, and worry should not be mentioned. Such words as fine, well, improved, better, good, fortunate, should be used to produce euphoria.

If this conversation did not produce the desired result, then simple mind abstraction was employed with the basic discussion centered on music.

The chair should be slightly inclined and the head rest adjusted to take the weight of the head off the muscles of the neck. When the patient had become comfortable in the chair he was gradually directed in the use of the music. Instructions were given for operating the volume control.

The Music is Started—The volume was adjusted by the patient to suit himself. The nasal inhaler mask previously described was placed carefully and lightly on the nose and the head strap made as loose as was consistent with maintaining the mask in position.

At first the expiratory valve was permitted to open only with expiration. It was soon discovered that the insertion of a cotton wad which kept it open with inspiration as well did not dilute the inhaled mixtures enough to interfere with the depth of anesthesia.

The machine was set to deliver 75 per cent nitrous oxide and 25 per cent oxygen. This mixture was further diluted at the open expiratory valve by an estimated 20 per cent.

Once the patient was asleep, the mixture could be further enriched with oxygen to as much as 35 per cent and even to 50 per cent.

Before the patient fell asleep the mouth props were inserted. The rubber or cork type were preferred. Throat packs were considered not only unnecessary but detrimental. Small 2 inch by 2 inch exodontia sponges with attached string were placed in back of the field of operation to catch blood and debris. It was felt that there should be no aspiration since the laryngeal and gag reflexes were not obtunded. Further dilution of the gases by oral inhalation of air apparently did not interfere with the level of anesthesia.

Various aromatic oils were introduced through the cotton in the expiratory valve to disguise the odor of the gases and the rubber. They were soon discarded because no favorable contribution to the anesthesia could be discerned.

Summary

In this method, designed to reduce reflex irritability without resorting to depressing premedicants, the nitrous oxide-oxygen mixtures were maintained with a minimum of 24 per cent of oxygen, more when possible, and further diluted with air.

Although no inspiratory, alveolar air, or oxygen blood studies were performed, no clinical hypoxia could be discovered. The mucous membranes, the conjunctives, and the nailbeds were closely watched for cyanosis. None was found. The blood pressure and pulse were checked frequently. Little variation was detected. Although it was often found that the respiratory rhythm paralleled that of the music, the pulse was unaffected except to the degree to be expected with the reduction of reflex irritability.

Advantages of the Procedure—Nausea, retching, excitement, jactitation, soft tissue obstruction, aspiration, and swallowing have been conspicuously absent. There was no immediate or delayed induction or emergent delirium.

Most of the patients claimed that dreams occupied their period of narcosis and that these dreams were always pleasant. Even children were attracted by the music and submitted docilely to the application of the nasal mask. One child alone out of a large number refused to submit to the anesthetic. Only two adults reported slight perception of pain.

The increased surgical latitude that this technique provides compensates considerably in the case of the patient who is a poor risk by extending the operating time from a minute or two to ten or fifteen minutes.

The longest recorded administration of anesthetic in this series of cases was twenty-three minutes. Emergence from the anesthetic is rapid and complete. The patient requires no assistance or support when leaving the dental chair.

1 *Nevins Street.*

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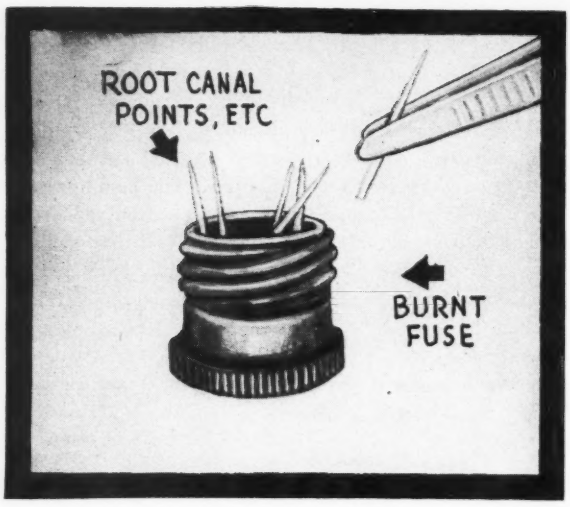
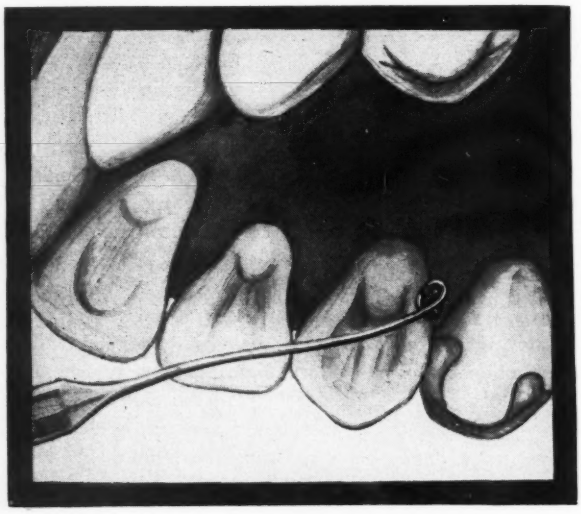


1

Dental Bracket Table Receptacle

William A. Sugars, D.D.S., Magog, Quebec, Canada

1. The glass part salvaged from a burned out fuse makes an ideal receptacle for medicaments and root canal points. The base being wider than the body gives this dish stability.

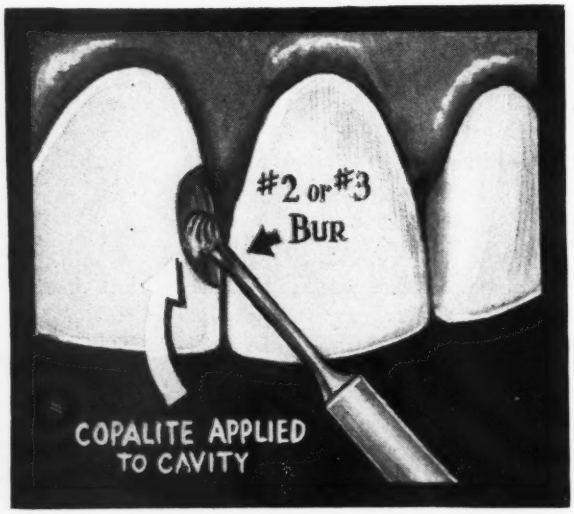


2

Adding Wax to an Upper Inlay Pattern

J. Meade Bowman, D.D.S., Knoxville, Tennessee

2. When waxing a direct pattern it is often necessary to add some wax. On an upper tooth the force of gravity pulls the wax from the point of the instrument. To prevent this, turn a loop on the end of a heavy blunt explorer. With the melted wax in the loop it is easy to deposit the wax at the desired place on the upper pattern.



3

Applying Cavity Lining

W. R. Nail, D.D.S., Dallas, Texas

3. Apply cavity lining such as copalite with a #2 or a #3 round bur. Using this method prevents the lining from touching the cavity margins.

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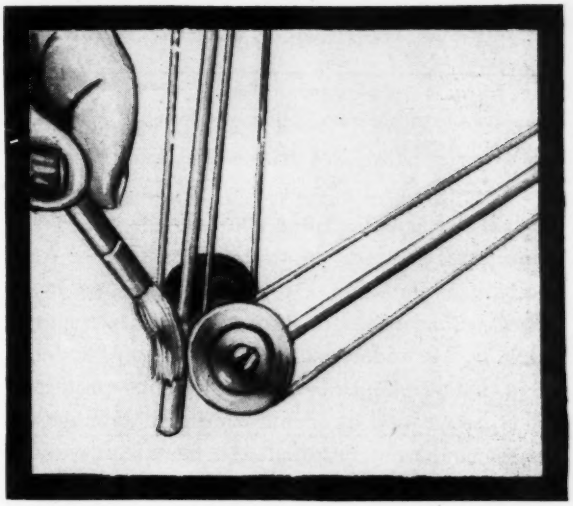
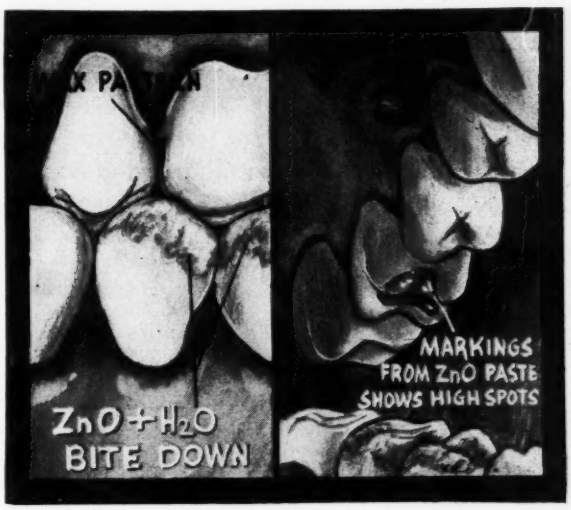


4

A Method of Cleaning the Arms and the Pulleys on the Dental Engine

I. N. Greenberg, D.D.S., New York

4. An ordinary paint brush about 1 inch in width is an excellent aid in removing the debris that collects on the arms and the pulleys of the dental engine. All recesses are easily reached with the dry bristles.

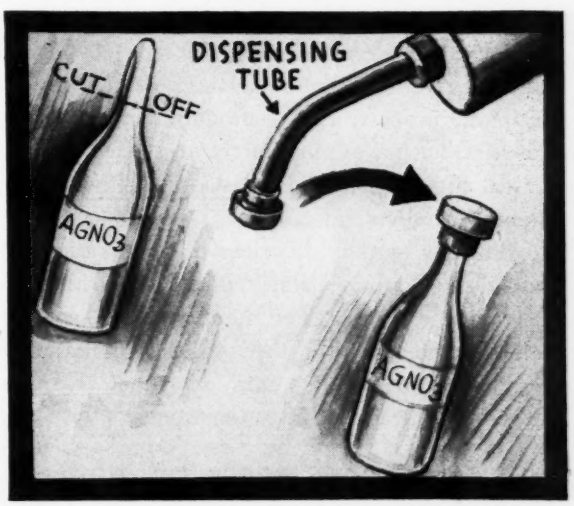


5

Checking Occlusion on Direct Patterns

Charles S. Gordon, D.D.S., Union, New Jersey

5. To check the occlusion on a direct wax pattern cover the opposing tooth with zinc oxide powder mixed with water. Have the patient close gently. The white zinc oxide paste will leave markings on the high points of the wax pattern.



6

Protection of Ampules and Dispensing Tubes

William B. Aumiller, D.D.S., Tunkhannock, Pennsylvania

6. When an ampule of silver nitrate has been opened it is necessary to protect the remainder of the solution from decomposition. To do so use a rubber stopper from an anesthetic tube. This kind of stopper may also be used to protect the tip of a dispensing tube.

suitable illustrations; write a brief description of the technique involved; and jot down the advantages of the technique. This shouldn't take ten minutes of your time.

Turn to page 476 for a convenient form to use.

Send your ideas to: Clinical and Laboratory Suggestions Editor, DENTAL DIGEST, 708 Church Street, Evanston, Illinois.

The EDITOR'S *Page*

AMONG THE paradoxes that we encounter in clinical practice is the frequent observation that heavy deposits of calculus often confer a form of caries immunity. Yardeni[1] in an effort to uncover some biologic explanation for this phenomenon made extensive bacteriologic studies of freshly removed calculus. He undertook his investigations "to determine bacteriologically whether some protective effect, some kind of immunizing principle against caries, could not be attributed to calculus as an entity, to its biosis and not to its mineral content."

Clinicians who have reflected on the paradox have developed various theories to explain the caries immunizing factor in the presence of calculus. The mass of material has been considered as a physical barrier and has protected the teeth from the attack by bacteria and their products. The presence of minerals in the calculus has been thought to exert some chemical method of neutralizing mouth acids. The pattern of distribution of microorganisms within the incrustation has been thought to play a possible role in conferring caries immunity.

Yardeni in his bacteriologic studies recognizes three distinct zones of microorganisms:

"(1) The calculus itself, with its petrified gram-positive filaments of the actinomyces type; (2) the zone encircling or adjacent to the calculus with gram-negative cocci and rods (in some specimens a pure culture of rods only, of the Type IV); and (3) the oral flora, in general, with the predominance of gram-positive cocci and bacilli."

In his biologic approach to the subject Yardeni asks the question if there may not possibly be some antibiotic property that is produced in calcareous deposits. Such a product might originate from the action of bacteria and yeasts upon the agents present in saliva and calculus.

Although Yardeni describes his observations of bacterial growth on plates inoculated with both saliva and calculus, where he observes a bacteriostatic phenomenon in the presence of calculus he does not identify the antibiotic agent. He uses these words to record his observations: "In a few tests of plates inoculated with both saliva and calculus, a clearcut distinction in growth between the plate as a whole and the zone of calculus can be demonstrated. On the one hand, lactobacilli, yeast, cocci, and leptotrichia proliferated, all gram-positive; on the other hand in smears from areas adjacent to the calculus, gram-negative bacilli predominated. In the thinner streaks of saliva, the lactobacilli, which multiplied in tiny beaded colonies on the lines of inoculation, thinned out and vanished (phenomenon of limitation of stationary population) whenever they encountered a piece of calculus. Their growth was interfered with by its presence. In heavy streaks, we missed this bacteriostatic phenomenon."

Calculus is not generally present during the years of greatest caries susceptibility. Few children and young adults show significant calculus deposit. We may use this fact as a two-edged argument:

1. We may say that caries in the young age groups occurs in the absence of the unknown inhibitory antibiotic and that this antibiotic appears in the personal life cycle at about the same time that caries immunity begins. It might be that this undescribed antibiotic aids in the production of calculus; that it is an end product in calculus formation; or that it is merely coincidental with deposit formation.

2. We may say that areas more likely to be involved in calculus formation are generally immune in all mouths. This is certainly true in the lingual surfaces of the lower anteriors and is less true of the buccal surfaces of the upper posteriors.

In view of the brilliant discoveries in the field of antibiotics it is not unlikely that saliva, bacteria, yeasts, and minerals may make some symbiotic combination to produce a caries immunity factor.

We should follow through on the work begun by Yardeni and attempt to identify this antibiotic factor that is present in some mouths. We should make the effort to explain why it does not often appear in childhood and youth. Finally, after identifying the factor we should be prepared to reproduce it and grow it at will the same as the other antibiotics and then use it as a preventive and therapeutic agent.

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[1]Yardeni, Jacob, *Journal of Dental Research* 27:536 (August) 1948.

MEDICINE and the Biologic Sciences

Aspirin—Toxicity

Acetylsalicylic acid (aspirin) is an artificial synthetic product introduced into therapeutics by Dreser in 1899. It is slightly soluble in water, slightly soluble in ether and highly soluble in alcohol, sodium carbonate and other alkaline fluids. Decomposition takes place in alkaline fluids which results in the formation of an alkaline salicylate.

The slow decomposition and dissolution of aspirin in the intestine permits a high salicylate tolerance. About 40 per cent of the ingested dose is eliminated in the urine as such and the greater part of the rest as salicylic acid.

Aspirin is a useful and effective drug which can be given with relative security. It may, however, produce allergic and also toxic manifestations. Over a period of twenty hours about 50 per cent of aspirin is hydrolyzed at the alkalinity of the intestines, 35 per cent at the acidity of the stomach and only 2 per cent at a neutral reaction. Administration of milk, or orange or lemon juice after each dose of aspirin is advisable.

The specific antirheumatic effect of aspirin is less than that of sodium salicylate. However, it has a high antithermic effect and a less harmful effect on the stomach. The contraindications to aspirin treatment are severe myocardial insufficiency and several degrees of renal impermeability.

It was suspected formerly that aspirin favored demineralization. This has not been produced, however, in experiments with animals. Aspirin may rarify the calcified zone of the ossifying cartilage. This effect is not due to the acid character of the drug but to the acetylsalicylic radical. Calcium-aspirin protects young animals from the harmful effect of aspirin on bone growth.

The therapeutic dose is 0.5 to 1.5 grams per day and in children 0.1 grams per day for each year of age. A dose of 8 to 10 grams may produce toxic reactions; the fatal dose is 20 grams. In allergic persons a dose of 0.3 to 0.5 grams may induce edema, urticaria and purpura, anxiety, mydriasis, conjunctival injection and cardiac depression.

Aspirin should be used with caution, if at all, in cases of nephritis, alcoholism, or diabetes.

Aspirin hypersensitivity is rather widespread and may be congenital or acquired. Although sensitive individuals may tolerate other salicylates well, aspirin is specific. Patients with asthma or nasal polypi are particularly allergic to the drug. Females are more susceptible than males. Many individuals allergic to aspirin have experienced other allergic reactions.

Allergic reaction involves the respiratory membranes first, the skin and gastrointestinal tract second. Often the patient's primary allergic source is aggravated. The allergic reaction may appear 15 minutes to three hours after ingestion of the drug. An approximation of allergic reaction can be determined by placing a small dose on the tongue. Coughing, itching and edema will appear within one to two minutes if the reaction is positive.

In cases of aspirin poisoning it is recognized that sodium bicarbonate accelerates the decomposition of aspirin and contributes to the formation of sodium acetate and salicylate. Its use for gastric lavage in aspirin poisoning is probably of value only up to two hours after ingestion before the greater part of the drug has passed into the duodenum. Treatment of aspirin poisoning is symptomatic and in allergic manifestations adrenalin is the remedy of choice.

Carratala, Rogelio: Acetylsalicylic Acid (Aspirin); A Toxicologic, Clinical and Experimental Study, La Prensa Argentenia 35:231 (*February* 6) 1948. *Transl. in Intern. M. Digest* 52:335-336 (*June*) 1948.

Automobile Injuries

The dental profession will be interested in a recent report on automobile injuries, presented by Claire L. Straith, a plastic surgeon of Detroit. The first, classified as "steering post injuries" includes injuries sustained by drivers. The second group, termed "guest passenger injuries" is composed of damage done to guest occupants of the front seat.

Sudden stops, forcing the driver against the steering wheel, cause "steering post injuries." The chin may be lacerated, the mandible fractured and in more serious accidents, the maxilla and nose may be involved. Chest, knee and ankle injuries are also common.

Still, the driver's is the safest seat in the car. A driver escapes harm in many major accidents because of the protection offered by the steering wheel.

In contrast to this passengers sitting beside the driver are in the most dangerous position in the car. In case of sudden stops they are unprotected. Children sitting on mothers' laps or standing in the front are often injured or killed when sudden jerks throw them against the dashboard.

Occupants of the "death seat" are injured in the ratio of about three to one as compared to drivers. In the records of Doctor Straith about 70 per cent of the guest passenger injuries occur among young girls and

women. In a series of 219 accidents, 260 passengers, but no drivers, were injured.

Head wounds, caused by being thrown forward are of three types:

1. The head frequently crashes through the windshield and the face comes in contact with jagged glass. Almost complete decapitation has been known in this type of injury. The nose is sometimes severely lacerated or partly severed. Bits of the forehead, cheeks, or ear may be detached by broken glass.

2. Often the head strikes the windshield and is then deflected downward on the dash. These glancing blows result in both cutting and crushing injuries. Excessive speed is not always a factor. Knobs, cranks, sharp ledges, etc., on the dash frequently do considerable damage. In both children and adults teeth are dislodged and many facial lacerations sustained by contact with dashboard projections.

3. Infants and children are often injured or killed by the violent impact of skulls or faces on the dash. Teeth are knocked out and faces cut on extending knobs, cranks, or "drop open ash trays." In some instances the nose is damaged and permanent facial deformity may be caused by the splintering of the malar bones and the maxillae.

Automobile-designing engineers are becoming increasingly aware of these hazards and steps are being taken to protect both the driver and passengers. Knobs and projections are being eliminated or reduced in size and number. A crash padding has even been incorporated into the dashboard of some cars.

Such casualties concern the dental profession in many ways. Prevention is the ultimate goal; in the meantime proficiency in treatment is imperative.

Straith, Claire L.: *Guest Passenger Injuries*, *J.A.M.A.* 137:384-351 (*May* 22) 1948.

Psychotherapy

Patients consult the general physician in an effort to find a physical cause for their troubles. But in at least one third of all patients no definite bodily disease can be found to account for their illnesses. In another third the symptoms are not explained by or related to any discoverable organic disease.

In the last group of patients there seems to be a definite relationship between the emotional life and the physical symptoms. In other words, the emotional factor apparently plays an important part in causing the disorder. The term psychosomatic affliction is often applied to this group.

The word psychosomatics is a new term describing an approach to medicine as old as the healing art itself. It is not a new specialty but rather a point of view which applies to all aspects of medicine, dentistry and surgery. It is a reaffirmation of the ancient principal that the mind and the body are interactive and interdependent.

When a person is sick he is sick all over. The mind and body are one and the patient falls ill for a combination of reasons, physical and psychic. Three basic factors should guide the approach to illness: (1) What sort of person are we dealing with? What are his inherited and acquired characteristics? His physical and psychologic traits? (2) What germs or allergens has he met? What emotionally disturbing events has he encountered? (3) What has happened to his physiologic mechanism? What is the pathogenesis of the disorder?

Heredity is often held responsible for illness that arises from environment. This in an important consideration to which too little reference has been made. Children identify themselves with their parents and unconsciously imitate them. Thus patterns are laid down (which include illness as an aspect of behavior), so early in life that we often attribute a disorder to heredity when in fact it was acquired.

Sympathy for patients suffering from illness of emotional origin is an essential part of the equipment of the person who is dealing with the psychosomatic problems of patients. A sympathetic effort should be exerted to induce the patient to reveal his true feelings. If some patients were allowed to talk more and were examined less the actual conditions would be made evident more quickly.

There are two main approaches to the study of the patient with suspected psychosomatic disorder. The first is a cross section study of his personality as he appears at the time of the interview. The second is a longitudinal survey of his life from early infancy to the present time. The longitudinal study relates his personality development to his medical history. The data from both reviews complement each other.

It is interesting to note that in the minds of many patients there may be one or more of three special fears. One of the most common is the fear of cancer; cancerphobia. Many people and indeed most women have that obsession at some time. This is especially true today because of the emphasis being placed on the early detection and treatment of cancer.

Another is the fear of heart disease. This may arise when there is pain in the precordial region, rapid beating of the heart, breathlessness and fatigue. It is difficult to reassure these persons for they feel that if the condition continues something unfortunate will happen. It is important that the patient be encouraged to speak freely so that the root of the trouble can be detected.

A third alarm is encountered among those who find that they are unable to concentrate well. This gives rise to a dread of "losing the mind." Ideas of suicide frequently accompany this apprehension.

Keeping these principles in mind makes it easier to render a more complete medical and dental service to a larger number of patients.

Weiss, Edward: *Psychotherapy in Everyday Practice*, *J.A.M.A.* 137: 442-448 (*May* 29) 1948.

Peptic Ulcer—General Considerations

The problem of peptic ulcer presents a challenge to medical science

since it ranks tenth in order of causes of death and twelfth as a cause of days' work loss. From available evidence it is estimated that about eight per cent of the people in the United States become afflicted with peptic ulcer during a lifetime.

Peptic ulcer is defined as that type of ulcer which is located upon the mucous membrane of the stomach or duodenum. It usually occurs in young adults and persons of middle age. Recent observations disclose that the incidence in older persons is greater than was previously supposed.

The condition is found more frequently in males than in females. The duodenal ulcer is more common than the gastric type. In a series of 15,567 patients with peptic ulcer the ratio was 1 gastric ulcer to 12.5 duodenal ulcers.

The cause of peptic ulcer is not definitely established. Several theories have been advanced. It is known that for some obscure reason areas of the mucosal lining of the stomach or duodenum lose their ability to resist the digestive action of the peptic acid gastric juice.

Regardless of the cause, clinicians recognize several factors which predispose to chronicity of the condition once it has been established. These are (a) acid, (b) rough food, (c) gastric retention, (d) poor nutrition, and (e) mucosal gradient of susceptibility to acid. The order of rank for decreased susceptibility is the fundic, the lesser curvature in the pyloric region, the pyloric, duodenal, jejunal and ileal mucosa.

Of possible etiologic factors the acid-peptic theory is the best known and most widely accepted. It is generally conceded that the stomach of a patient with peptic ulcer loses its ability to resist the digestive action of the acid pepsin secretion. Added to this, the presence of free hydrochloric acid is necessary for the production of ulcers.

In considering peptic ulcers one must not overlook the role of emotional states as possible causes. One of the first steps is to decide whether emotional or psychic factors are basic causes or merely contributory. The patient should be considered as a whole, however, and the emotional factor should not be over emphasized.

Peptic ulcer is characterized by paroxysms of pain which may be dull, aching or burning but not lancinating. In gastric ulcer the pain is usually noticed shortly after meals since the food ingested protects the lesion from the gastric juices for a short time. As the food passes on the ulcer is again exposed to the action of the peptic acid.

Duodenal ulcer pain does not occur for some hours after the food is ingested since the duodenum is not only farther along the tract but is also narrower and slows down the passage of food. This allows a longer protective action.

Certain types of food, such as albuminous materials and those with great acid combining properties relieve the pain more successfully than those which do not possess definite acid-combining properties. Pain is also increased by foods which delay the emptying of the stomach.

The treatment of this condition has two aspects. The first aim is to heal the ulcer in as short a time as possible and to remedy any complications such as hemorrhage, obstruction or perforation. The second is to prevent recurrences. At the present time the latter is the more difficult to accomplish.

Physical and emotional rest are imperative in treatment. The diet should be highly nutritious in order to promote healing. Fat has an inhibitory action on gastric secretions, a fact that should be remembered in the dietary control. Smaller amounts of bland food taken at frequent intervals will serve as buffers for the acid. Milk usually forms the basic item in such a diet since it not only provides some of the necessary vitamins but also aids in neutralizing gastric acidity. Milk possesses a high protein value and in small quantities is effective.

The diet recommended by Sippy combines antacid administration with frequent feedings to excellent advantage. In some cases diet alone may be sufficient. In cases which do not respond to diet and in which there is excessive hyperacidity and hypersecretion antacids are of value. Tribasic calcium phosphate and tribasic magnesium phosphate are considered to be neutral antacids which are not absorbed and provide a prolonged neutralizing effect.

Peptic Ulcer: Its Causes and Therapy, American Professional Pharmacist 14:525-528 (*June*) 1948.

Hurst, A. F., and Stewart, M. J.: Gastric and Duodenal Ulcer, Oxford University Press, New York, 1929.

Amino-Acids

Of all the fundamental materials essential to the biologic process of life the proteins are by far the most interesting and most complex. Proteins appear to be the very stuff of life itself. Because of their diverse forms they have a variety of functions.

When we fully understand the electrophysic and configurational chemistry of proteins, the line that separates animate from inanimate matter will have narrowed to proportions almost imperceptible. At present we know that proteins are large molecules composed of amino-acids joined in peptide linkage.

The amino acids display a number of curious properties. Many of them dissolve in water to form highly concentrated solutions that, even though they are electrically neutral, exhibit properties similar to ionized salts. They are highly sensitive to their biochemical environment. Proteins may be considered the building stones of the essential body tissues.

Through the media of these simple amino compounds, ingested proteins unsuited to the needs of cellular metabolism are converted, after appropriate digestion to the amino-acid form, into the endless variety of hormones, enzymes and essential proteins whose balanced interaction maintains life. As a result of research, the clinician is certain of three facts

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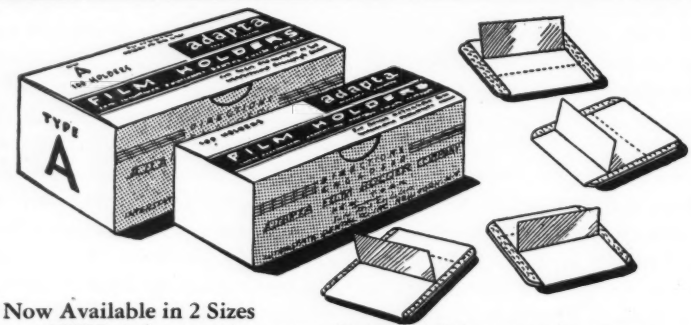

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today. In the depleted protein-starved individual, amino acids are readily absorbed, they are essentially non-allergenic and they supply nitrogen in its most useful form. Beyond this we cannot go far for the moment.

The amino acids considered essential are tryptophane, theonine, valine, phenylalamine, methionine, hysine, leucine, isoleucine, histidine, arginine and cystine. Cystine appears to be the key acid in plasma-protein regeneration.

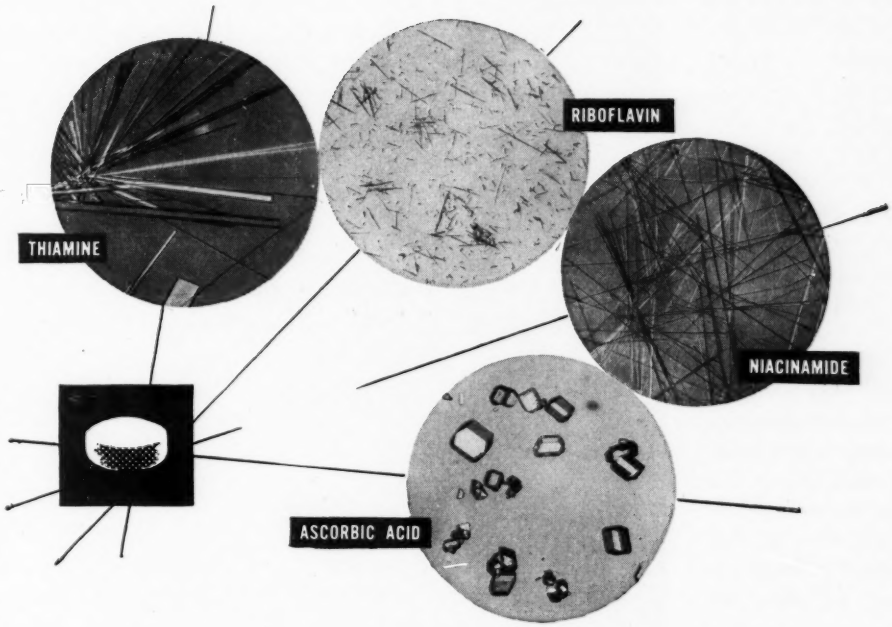
Some of the amino acids can be transformed into one another in the body or synthetized from ammonia and keto acids. However, only about one-half of the required amino acids can be formed in this way. The other half must be made by plants, bacteria or other organisms with greater synthetic powers than the human body. These amino acids must be supplied to man in the form of vegetable and animal food.

Present knowledge permits the establishment of optimal amounts of amino-acid mixtures which will come close to replacing tissue protein weight for weight, or supply new material for growth. The importance of dietary amino acids in the nutrition of the body and their intricate relationship to its tissue and functions accounts for the fact that the symptons which develop when protein nutrition is insufficient are not characteristic of the type of malnutrition present when other nutrients are inadequate.

A general cachexia and a general wasting away of all the tissues may be the only symptom at first. Later, a demonstrable hypoproteinemia and an edematous condition of all the tissues may ensue. After a prolonged and generally miserable existence the protein-deficient organism will ultimately succumb through a simultaneous failure of all of its parts. This process, as noted in experiments with animals, is evidence that the proper nutrition of each of the body parts is dependent in a very intimate and essential way upon an adequate supply of amino acids.

In a consideration of the cause of

(*Continued on page* 468)



Basic therapy for healthy oral mucosa

Four vitamins are essential for the integrity of buccal mucosa. Three of them—thiamine, riboflavin and niacinamide—are members of the B complex; these, together with Vitamin C, are referred to as the "critical water soluble vitamins".

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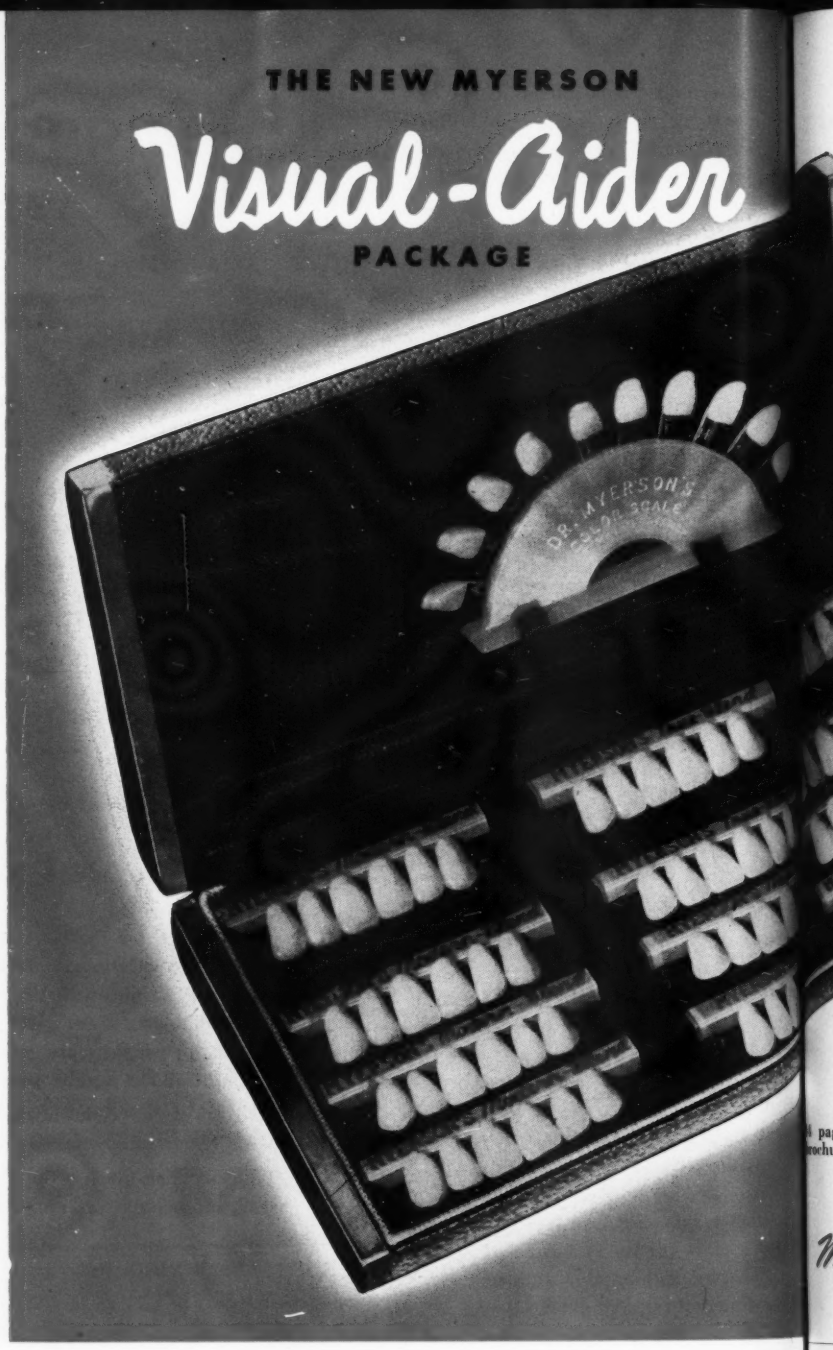
worm's eye view . . .

The above, of course, is just a figure of speech. What we are trying to do is think objectively about ourselves from the patients' viewpoint, specifically in this case in respect to their personal feelings about dentures. Patients are quite important to us—about as important as our good right arms, probably, and what they think and say out loud about our professional skill has a vital bearing on our progress, both individually and collectively.

Your Toothsayer has long made it a habit to question denture wearers among the laity at every available opportunity regarding their "prides and prejudices" on this subject. The replies are always interesting and frequently significant. They are furthermore usually black or white and almost never grey. An apparently moot question, often encountered, is the relative importance in their eyes of function vs esthetics. Naturally everyone desires both in a denture but frequently he gets only one, and too often neither.

esthetics vs function

It can be safely said that function is the more important because after all teeth are primarily designed to masticate with, comfortably and efficiently. But does the patient always think so? And does he become dissatisfied with an efficiently functioning denture (and say so) if he considers that his facial appearance has deteriorated? Quite often, it appears, he does. Even more often *she* does, for the female of the species is admittedly the more cosmetic-conscious. It would appear from this, therefore, that there is considerable need for further education on our part along the lines of better esthetics. It is observable at any dental meeting that clinics on mucostatics, impression techniques, and denture engineering in its many phases are always among the most popular. The net result over the years has been a vast improvement in overall denture construction, fit and function.



esthetics neglected

But one seldom sees classes being held on "denture appearance"; on the proper selection of mould and shade; on the varying degrees and conditions of wear that must be simulated; on the selection of the denture base material and its color relation to the surrounding tissue; on setup of the anterior teeth and so on. These matters seem to be of relatively less importance to the practitioner, but are they to the patient? We believe not. We believe they are of paramount importance in the patient's mind.

And yet good esthetics are reasonably easy of achievement. Much of

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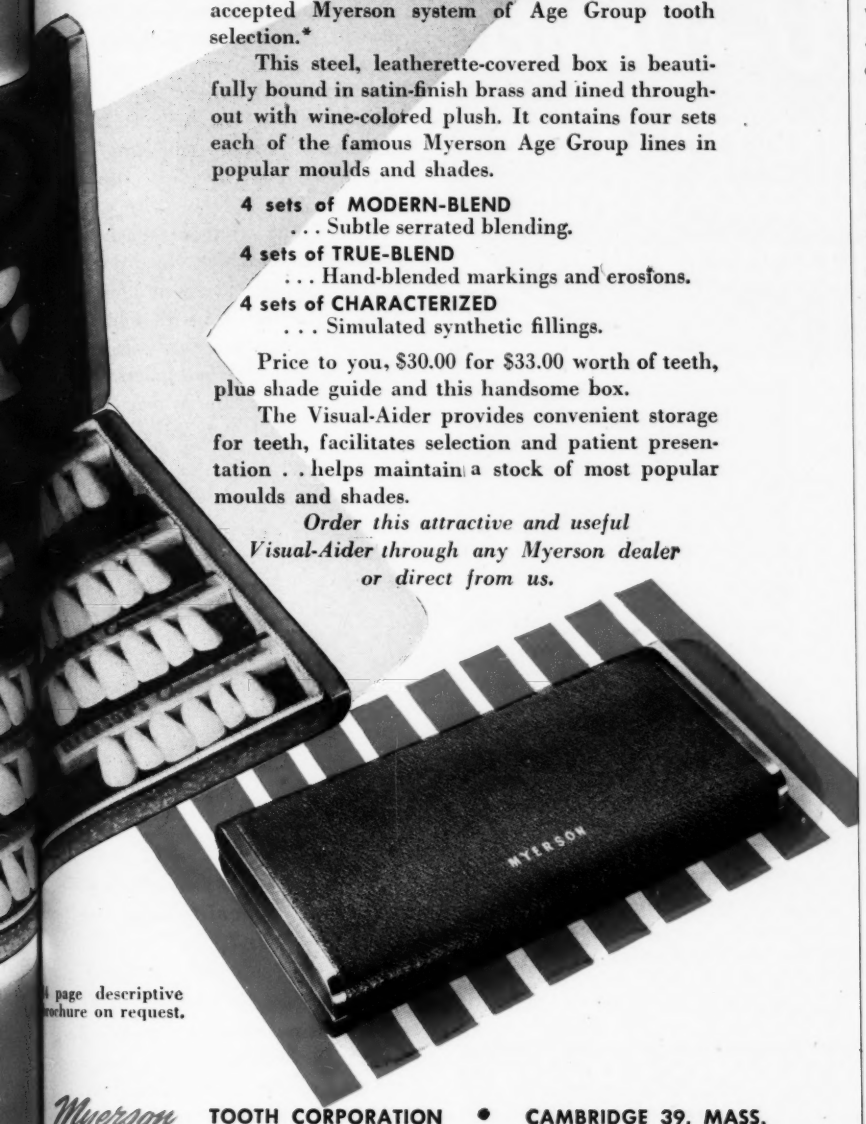

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the research and preparation necessary has been contributed to us by the manufacturers of the materials we use in denture construction. Contrary to denture function, which is largely a matter of professional skill, denture esthetics becomes more a problem of choice. The materials are at hand, the research has been done (up to this point) and it is possible to simulate the patient's original anterior aspect when known so as to almost defy detection, unless he or she is of the type that desires to be "prettied up," in which case the problem is even less difficult.

artistry required . . .

The successful prosthetist must be both a good engineer and something of an artist. Skill, imagination and often some daring are required in the procedure of anterior setup but even if those qualities are lacking a worthwhile result can often be achieved if the proper teeth and denture base are used.

There are available today artificial teeth that not only are produced in the usual variety of moulds and shades, but also in varying degrees of labial wear and characterization. Teeth do darken with age. But they also wear observably. It is a fallacy to state that age can be simulated by using darker teeth, because teeth do not necessarily become *just dark,* with age — *they become darker than they originally were,* which is something else again. This may and often does mean that an extremely light set of teeth may still be extremely light thirty years later, even though darker than originally. Therefore, how can an arbitrary group of shades be set up to be prescribed for specific age groups?

all 3 are required

The only logical answer is that true natural esthetics can only be achieved by considering *ALL* the yardsticks with which teeth can be measured. That means, 1) mold; 2) shade; 3) labial age characterization.

Many esthetics-conscious dentists are finding in the Myerson system the most satisfactory tools for fulfilling all 3 yardstick requirements. By using a Myerson mold chart or guide for mold and a Myerson Color Scale for shade, they are then prepared to take advantage of the fact that the mold and shade selected are available in 3 lines, each with different degrees of labial age-characterization.

These same dentists also find that a small packaged selection of the three labial types in patient visual presentation is an important phase of the dentist-patient relationship.

On this subject, more in later issues.

The Toothsayer

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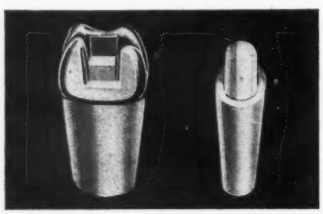

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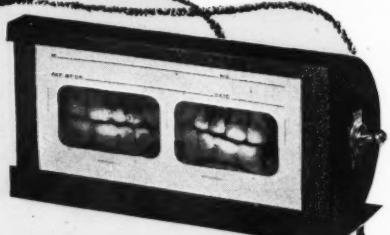

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(*Continued from page* 464)

protein deficiency, the deficiency may result primarily from an inadequate protein intake and secondarily from a caloric insufficiency.

High quality protein and calories are two dietary essentials. A lack of either may constitute a limiting factor which hinders effective convalescence.

As a result of these conclusions, commercial products incorporating the amino acids have been developed. They are being used with a high degree of success in many conditions. The requirements of each case should be evaluated and the proper amount of the product then given over a period of time.

Balance and Ledinac, Lederle Laboratories, New York, pages 3-18, 1948.

Contra-Angles

Does the Presidency Shorten Life?

This is a cheerful query directed to the gentlemen who are now bashing their heads over the Presidency. According to the Metropolitan Life Insurance Company, "the unsuccessful candidates for the Presidency have fared much better, on the whole, with respect to longevity than those who were elected to national leadership."

Late in the evening of November 2 all except one of the candidates may heave a sigh and sit back to say, "I'm better off anyway." The one who is elected will be sent along into his new job with the knowledge that it is a man-killer.

In an election year the study of the Metropolitan Life Insurance Company is particularly interesting. It was published in 1946 so it cannot be called an attempt to influence votes for anyone now running for office.

(*Continued on page* 470)

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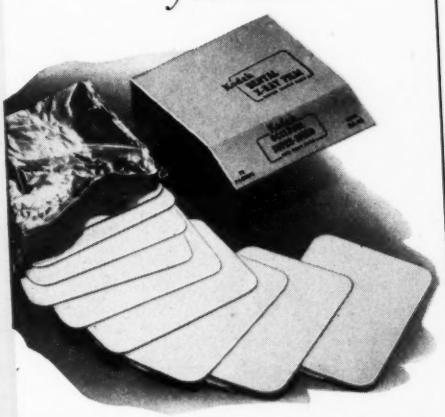

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"Only twelve of our thirty deceased Presidents outlived their expectation of life at inauguration, and the long-lived executives were concentrated, for the most part, in the earlier period of the Nation's history. Of our first ten Presidents, eight lived beyond their inauguration for more years than would have been expected on the basis of mortality conditions then prevailing; the exceptions are George Washington and William H. Harrison. On the other hand, of our Chief Executives since 1900, only William Howard Taft survived his expectation of life at inauguration. Herbert Hoover, our only living ex-President, has practically reached the mark, while the present incumbent—Harry S. Truman—has many years to go before attaining the expectation of life reckoned from his inauguration.

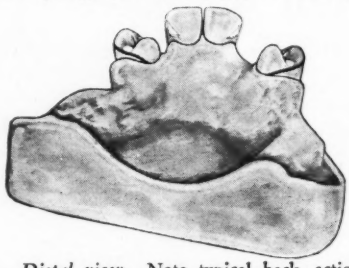
"Our Presidents are, with few exceptions, well in or past midlife by the time they enter their high office. The youngest was Theodore Roosevelt, who was only 42 years of age at inauguration. Five were between 45 and 49 years of age; eleven between 50 and 54; nine between 55 and 59; four between 60 and 64; and only two were over 65. The oldest, William Henry Harrison, died one month after taking office at age 68. Except for President Truman, none of our Chief Executives since Buchanan (inaugurated in 1857) had passed his 60th birthday before inauguration. In contrast to an average age of 58⅓ years at inauguration for those taking office before 1850, the succeeding incumbents averaged 52 years.

"The physical and mental strains in rendering executive decisions in a highly industrialized nation of 140,000,000 people undoubtedly exceed the burdens that were imposed by an essentially agricultural economy of a few million persons. In order to help ascertain whether the added burdens of our later Presidents have affected their length of life, a comparison was made of their expectations at inauguration with the years of life actually lived from that date to death. This comparison excludes William Henry Harrison who served only one month, and Presidents Lincoln, Garfield, and McKinley, all of whom were assassinated. On this basis, it was found that the Presidents who took office before 1850 outlived their expectation of life at inauguration by an average of 2.9 years. On the other hand, the Presidents who served from 1850 to 1900 fell short of their expectation of life at inauguration by an average of 2.9 years. The deficiency is increased to about six years when the three Presidents who were assassinated are included in the computations for this half century. The Presidents who have held office during the present century have made an even poorer record; their length of life since inauguration has been, on an average, eight years less than their expectation of life at the time of taking office. Even if allowance is made for the exclusion of Herbert Hoover from this group, the difference is still appreciable.

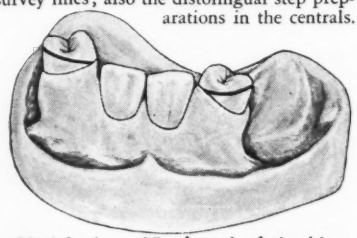
"It can hardly be inferred from these figures alone that the Presidency now takes years of life from its incumbents. There are other factors

CASE HISTORY IN GOLD*

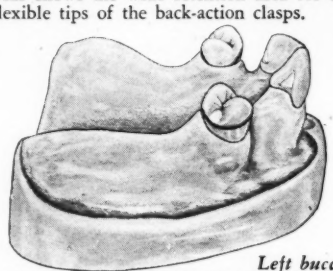
The problem in this case was to plan a restoration for an upper arch with only four teeth remaining in it, which would have adequate stability of the free-end saddles and, at the same time, avoid an excessive display of gold. Because back-action clasps could be placed on the bicuspid abutments to hold the saddles firmly against the tissue, it was unnecessary to clasp either of the cen The polished NEY-ORO G-3 ca illustrated weighed only 6.25 dwt the same basis a PALINEY #4 ca would weigh 5 dwt. Whenever b action clasps are being used on a gold is the ideal structural ma because of its remarkable resilien combination with flexible strengt



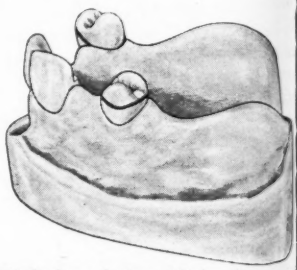
Distal view. Note typical back-action survey lines; also the distolingual step preparations in the centrals.



Mesial view. The buccal of the bicuspids shows the wide retention area for the flexible tips of the back-action clasps.



Left buccal view. The upper right bicuspid clearly shows entire absence of lingual undercut.



Right buccal view. Notice the very de nite support obtainable when the distol gual slice preparation is properly cut in t central. This type of rest has the advanta over an incisal hook because it does n show gold and, in addition, is preferable the usual continuous lingual strap in th it is not so likely to cause drifting of central.

NEY GOLD

* Number Fifteen of a Serie

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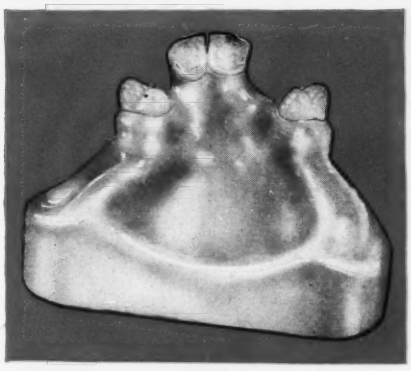

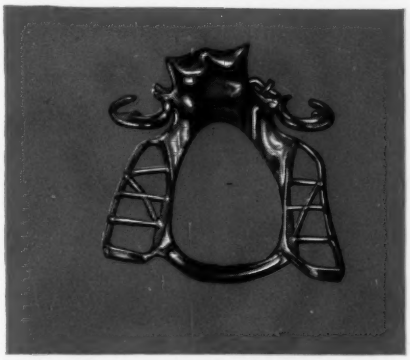

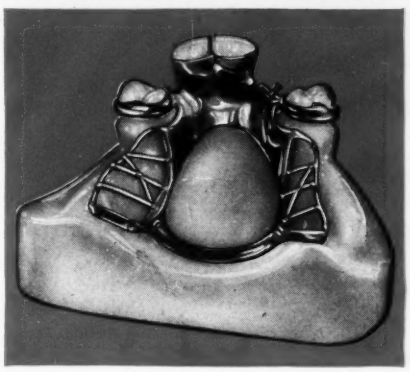

Analysis with the Ney Surveyor showed clear-cut back-action clasp indications on the bicuspid abutments, i.e. no lingual undercut, a slight distal undercut, and a well-defined buccal undercut.

The appliance was further designed with anterior and posterior palatal bars, the anterior bar coming up over the cingulum of the centrals and having, on the under side, two step rests to fit the slice step preparations in the distolingual of each tooth. The posterior bar serves to prevent the saddles from spreading in use.

Distal retention of the back-action clasps hold the free-end saddles securely against the ridge. For support (in addition to the saddles), rest seats are prepared in the four natural teeth, being careful to cut the seats so that all forces to be applied will be at right angles to the long axis of each tooth. Bracing is obtained from the steps in the centrals, the truss arms and rigid parts of the back-action clasps, and from the broad saddles.

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to be considered, such as the burdens of their public services before taking office. It is true, however, that unsuccessful candidates for the Presidency have fared much better, on the whole, with respect to longevity than have those who were elected to national leadership."

Fluorine Therapy— Ballyhoo versus Health Education

Let a wild, imaginative reporter get busy on a health subject and there is no telling what kind of preposterous story he will come up with. Fluorine is the latest subject to draw forth the superlatives and the words, "miracle and wonder." To read some articles in newspapers and magazines it would appear that fluorine therapy is just as specific for tooth decay as quinine is for malaria, and easier to use. These half-baked health writers have had it sound that applying fluorine was as easy as combing the hair and a positive, surefire preventive for caries.

It's good to find a qualified writer with the willingness and the ability to analyze the fluorine situation in direct and unmistakable language. The *New York Journal of Dentistry* is to be commended for its enterprise in publishing the article by Henry C. Sandler, D.M.D., M.P.H. Here is Doctor Sandler's forthright article:

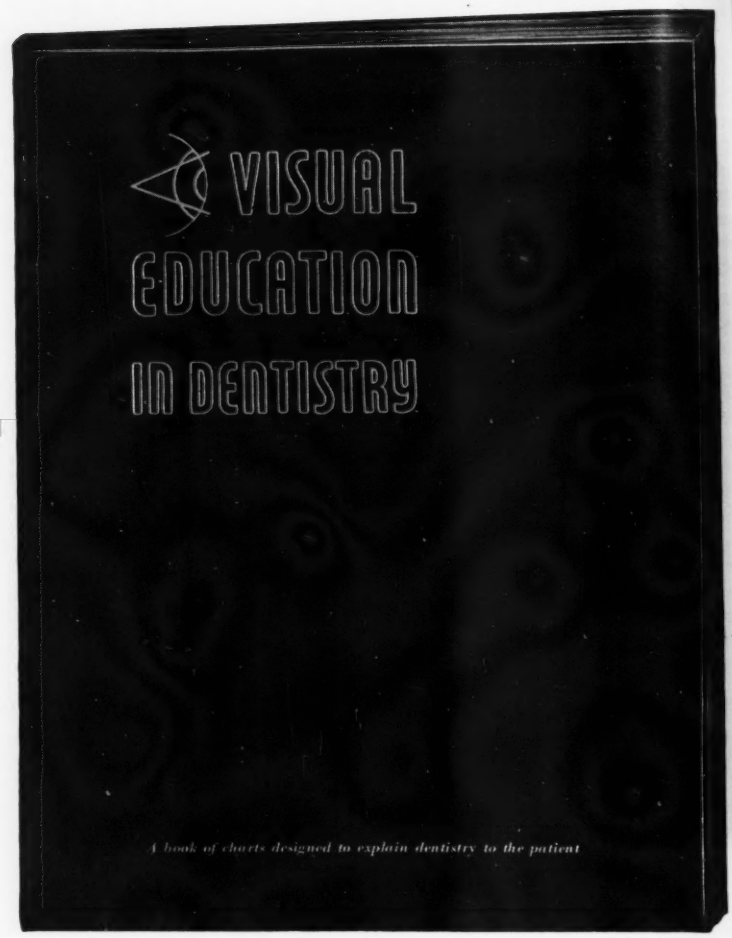
"Fluorine therapy may turn out to be one of the greatest boons to mankind, but unless the ballyhoo publicity which has surrounded it is quickly corrected, public confidence will be badly shaken and the dental profession is due for an embarrassing headache.

"The research to date seems to be sound. The clinical results have been repeated by several investigators and the statistical evidence points to a substantial degree of protection from the topical application of sodium fluoride. The difficulties that arise are due to the manner in which the information has been presented to the public. The carefully worded statements of research workers have been distorted and misstated so that most people received the impression that this new procedure is a cure-all for dental ills.

"In the past several months dentists have been asked about patient reaction to the publicity. A dentist from Massachusetts writes that patients have been oversold, that they do not realize that caries is still possible after treatment; and that such a *simple* treatment does not warrant a fee. Two dentists from Connecticut and at least a dozen interviewed at the annual meeting held at Syracuse, N.Y. had had similar reactions from patients. All of these dentists are vitally interested in dentistry for children, are members of the American Society of Dentistry for Children, and were among the first to use the technique.

"An opinion survey conducted among school teachers, health workers, one school principal, several clerks and stenographers indicates that except for minor differences, they have the following understanding about the topical application of fluorine. (1) The technique involved is so simple it requires no special

(*Continued on page* 474)



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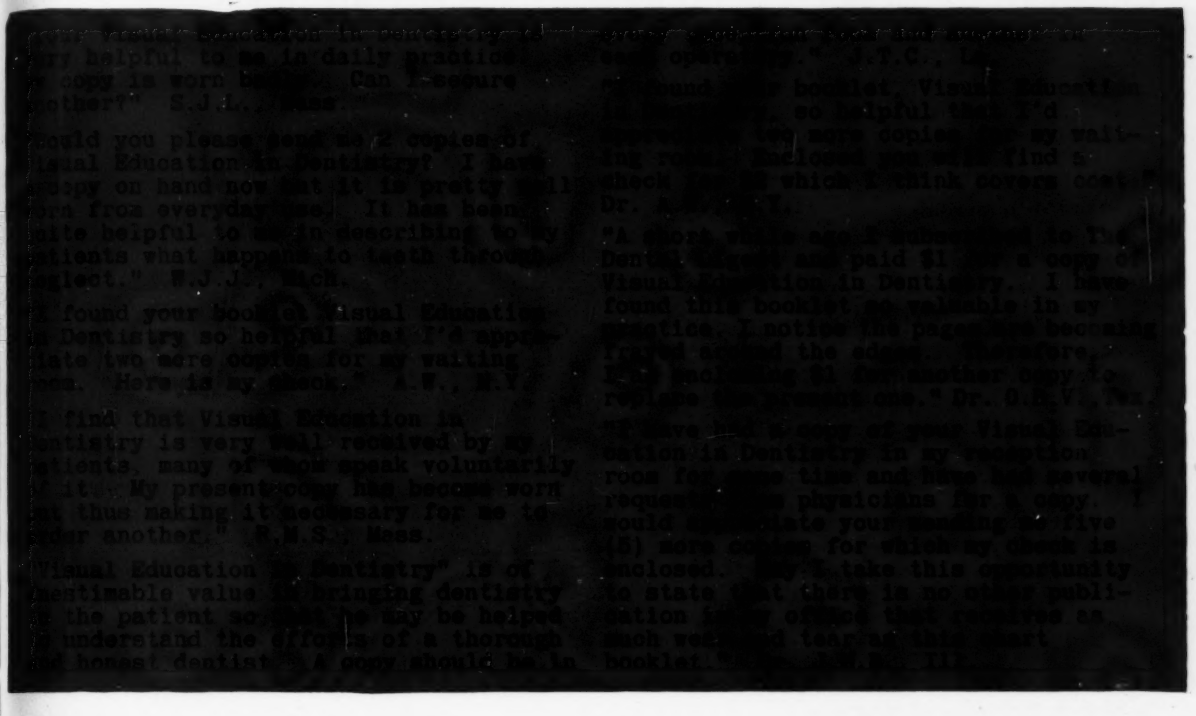
Yes, *every dentist* should have two copies of *Visual Education in Dentistry.* This statement is made without reservation because we know that *you,* like thousands of practitioners have been doing, can use this series of charts in *your* reception room and in *your* operatory.

As this message was being written we have received the following letter from a Michigan dentist: "I wish to express my extreme pleasure in reading your booklet 'Visual Education in Dentistry.' It plays a prominent role in my office in patient-education." *See other typical comments on opposite page.*

TYPICAL COMMENTS WHICH MADE A NINTH REPRINTING NECESSARY . . . .



Visual Education in Dentistry is more widely used in patient-education programs in dental offices than any other material of a similar nature. Surely there is a reason why the sale now totals over 85,000 copies!

Once *you* use this series of charts in your practice you'll use it constantly. Tangible evidence that thousands of your colleagues are using them is the fact that the current edition is the *ninth reprinting.*

Despite much higher production and paper costs the price of the latest reprinting is still only $1.00 to regular subscribers to Dental Digest. To non-subscribers the price is still $2.00 unless purchased in combination with a subscription (see coupon). The low price is possible only because of the tremendous demand for the charts which show pictorially the *value of periodic dental care and the danger of neglect.*

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(*Continued from page* 471)

ability, (2) it only takes a few minutes, (3) it prevents tooth decay indefinitely, (4) children need not visit the dentist for three years after the treatment, (5) it is probably good for adults too, (6) a mouth wash will soon be developed.

"Each one of these beliefs is unwarranted by the following facts:

"1. The technique is not simple. It is not as complicated as most dental operations but it takes a degree of knowledge, experience, skill and patience to block off the salivary ducts, dry the tooth surfaces, apply the solution and prevent saliva from coming in contact with the treated teeth for five minutes. Dentists know how difficult it is to maintain a dry field in a young child who has a shallow lingual floor.

"Furthermore, the actual application must be preceded by a cleansing. Most dentists feel, that if they are going to do the job at all, they may as well do it thoroughly. They reason that a thorough prophylaxis should precede the first treatment, and that the solution should be carefully applied so that it reaches all crevices and interproximal areas. Certainly mucous plaques, calculus and stain should be removed first.

"2. It takes time. No cleansing can be done in less than 15 minutes. A thorough prophylaxis, especially if green stain is present, requires considerably more than 15 minutes. The blocking off and drying of a quadrant cannot be done in less than two minutes; the solution is expected to remain on the teeth for 5 minutes; a total of 7 minutes per quadrant or 28 minutes for the mouth. Add to this 15 minutes for cleansing of the teeth, a few minutes to wash the hands and prepare the patient, and the first visit cannot be less than 45 minutes of chair time. The teeth do not require cleansing again during the subsequent three visits so that only 28 minutes for each visit needs to be allowed. With no allowance for the time required to apply the solution, and including only the most perfunctory cleansing, the series of treatments must take a *minimum of two hours and seven minutes*. This refutes the statements made by radio commentators and newspapers that it only 'takes a few minutes.' The patient who is under the impression that the whole procedure takes but a few moments cannot help but question the ability and honesty of the dentist, especially when the patient is charged a fee for more than two hours of chair-time.

"3. It does *not* prevent all tooth decay. Under experimental conditions and among large groups of children approximately 40 per cent *less new caries* occurred in treated teeth. Stated differently, this means that the average child who was destined to develop ten cavities within a three-year period would develop only six cavities after fluorine treatment. Or, on the average, for every five untreated teeth ordinarily expected to become carious, only three treated teeth will become carious.

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"The 'average' is a statistical device for describing mass phenomena that vary in individuals. There will be some individual children who will continue to develop more carious teeth than the average, treatment or no treatment. However, parents are not interested in statistical concepts. The dentist may well ask himself if a mother will be satisfied with a post facto explanation that her particular child, who has developed three carious teeth would have developed five carious teeth if treatment were not given.

"Several people of above average intelligence were asked the following question, 'Suppose that two years after treatment your child developed two cavities, would you think that the dentist or the technique was at fault?' The consensus was that either the applications were not thorough enough or that more applications

CLINICAL AND LABORATORY SUGGESTIONS

(*See pages* 458 *and* 459)

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were needed. None of those interviewed expected teeth to decay.

"Unless parents are prepared for the contingency that dental caries will continue, whether or not fluorine is applied, the integrity of the individual dentist and the dental profession will be questioned every time a new cavity appears.

"4. Children are *not* protected for three years. Research workers say that the forty per cent protective qualities of topical applications seems to be effective for three years. The corollary of a forty per cent success is a sixty per cent failure. However, little mention has been made of the sixty per cent susceptibility which is ever present after treatment. Only the expected success is remembered by the patient.

"As a result of the health educational efforts over the last decade, there has been a growing public appreciation of the value of children's dentistry. Parents are beginning to appreciate the widespread frequency of dental caries, the preventive orthodontic value of saving deciduous teeth, the relation of dental health to general health and the importance of regular visits to the dentist. The introduction of a concept of guaranteed dental caries prophylaxis tends to establish a false sense of dental health security. It is true that no dentist or research worker advocates the neglect of early detection and treatment. But neither has there been very much emphasis upon the importance of continued dental care. The sensational articles on fluorine application rarely, if ever, mention dental treatment.

"5. No responsible research worker has claimed that the treatment is effective in adults. Laboratory evidence seems to point toward such a possibility but clinical trials have all been failures. Nevertheless, magazine and newspaper articles still claim that it has value for adults. Patients have been known to insist upon the treatment and when the dentist points out the facts they feel that the dentist is deliberately withholding a valuable treatment.

"6. All of the evidence points to the fact that home medication with

sodium fluoride tooth pastes, mouth washes and tablets is valueless for the prevention of dental caries.

"Topical application of sodium fluoride is probably a desirable procedure for children. The public is misinformed as to the simplicity of the technique, the time required for its application and its protective qualities. Many people are not aware that it is not a substitute for continuous dental care and that there is no evidence that it is of value for adults. This lack of information will inevitably lead to patient-dentist misunderstanding, will undermine patient confidence in the dental profession, and will give parents a false sense of security about the dental health of their children. Home medication with tooth pastes and mouth washes containing sodium fluoride has never been shown to be of any value. Professional responsibility requires that this be made clear to the public."

—E.J.R.

Advertising Index

Ames Co., W. V-B. 479
Austenal Laboratories, Inc...474-75
Bosworth Co., Harry J. 468
Bristol-Myers Co. 433
Castle Co., Wilmot 478
Caulk Co., The L. D. 438
Columbus Dental Mfg. Co. 439
Cook-Waite Laboratories, Inc.. 434
Continental Chemical Co. 464
Corega Chemical Co. 479
Dental Perfection Co. 440
Dentists' Supply Co., The..4th cover
Eastman Kodak Co. 469
Flossy Dental Corp. 475
Hanau Engineering Co., Inc. .. 468
Hygienic Dental Rubber Co. .. 464
Interstate Dental Co., Inc. ..440-464
Justi & Son, Inc., H. D. ...3rd cover
Luxene, Inc. 436-37
Mosby Co., The C. V. 441
Myerson Tooth Corp. 466-67
Ney Co., The J. M. 470-71
Smith & Son Mfg. Co., Lee S. .. 476
Squibb & Sons, E. R. 465
Universal Dental Co. ....2nd cover
Vernon-Benshoff Co. 435
Warren-Teed Co. 442
Williams Gold Refining Co. 480
Wilmot Castle Co. 478
Young Dental Mfg. Co. 475

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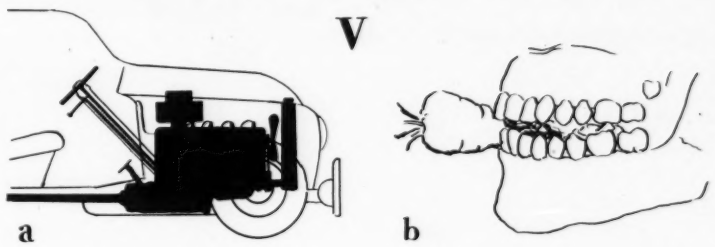

"It's Analogous, Doctor"

Mention of marbles, motors, hammers, planes, peanuts, bread dough, and rubber . . . helps Doctor Harold P. Winkler explain dental conditions to his patients without using hard-to-understand technical terminology. He says:

"The main idea is not to talk down to the patient, but to talk to him at his own level. He will then better appreciate and understand your efforts in his behalf, and remain a loyal, intelligent, and dentally conscious patient. Isn't that what we all want?"

★ ★ ★

"Dental Licensing Versus Democracy" . . . This time it's a newspaperman who explains the ills resulting from restrictive state licensing of dentists, and who suggests that full reciprocity would benefit the public as well as the dentists. The article originally appeared in *The Arizona Times.*

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Do children walk into your office with a smile? Doctor Alvin Frederick Gardner has made his reception room and operatory so attractive to the youngsters that they are apt to come early and stay late. Sometimes they even forget he's a dentist, and call him "Mister."

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Caries and the common cold probably furnish more controversial conversation than any other two maladies of man. Doctor Harold S. Jones, in his article, "Caries Is a Disease —Treat It As Such," says:

"Unless we recognize a constitutional basis for oral destruction, seek the facts, suggest the possible remedy by physical and mental good health, we will continue to be artisans."

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"The Role of Oxygen in General Anesthesia" . . . Doctor Louis Willinger gives a great deal of detailed information which should interest every dentist who administers general anesthetics. Doctor Willinger is Visiting Oral Surgeon in Charge of the Oral Surgery Clinic, Lebanon Hospital, New York.

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John W. Cooke, D.M.D., in discussing "Scholarships for Teachers," stresses the fact that "education is *not* a building program . . . Education is the *teacher.*" We need more good teachers, yet cannot offer salaries which attract men of stature. He suggests a plan to solve some of the dental educator's problems.

★ ★ ★

"Don't Be Afraid to Say 'No,'" urges Florence E. Biller in discussing contributions which dentists are asked to make to various causes and organizations. She gives ten rules for the wise contributor and a check list to help him determine the worthiness of causes and the soundness of organizations.

★ ★ ★

Don't overlook—"Ask Oral Hygiene," "So You Know Something About Dentistry," "Technique of the Month," "The Publisher's Corner," "Dentists in the News," "Editorial Comment," and "Laffodontia."

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See pages 436-37 D.D.10

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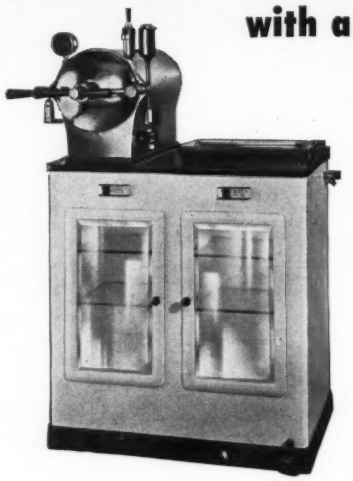

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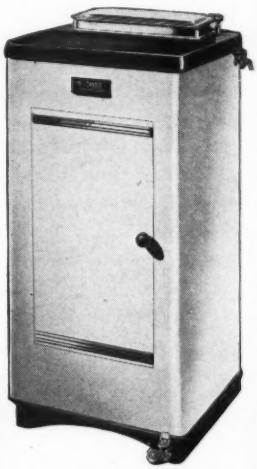

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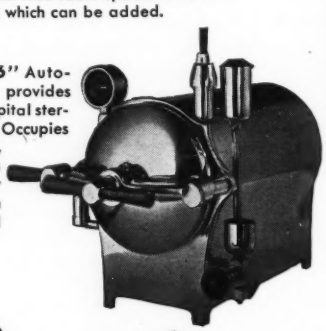

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Vol. 54, No. 11

Dental Digest

NOVEMBER 1948

Why Partial Dentures Fail
Robert M. Appleman, D.D.S. 490

Planning and Designing Partial Dentures (Second Installment)
A. H. Schmidt, D.D.S. 498

Early Symptoms of Neurologic Disease (An Abstract) 502

Postextraction Alveolectomy and Alveolectomy for Immediate Dentures
Stewart Everson, D.D.S. 503

Impregnation for Caries Prophylaxis (An Abstract)
Bernhard Gottlieb, M.D. 505

Restoration of Facial Contour with Plumpers
Captain Melvin L. Moss (DC) and Captain James W. Thomason (DC) 506

Trigeminal Neuralgia (An Abstract)
Leo Davidoff, M.D. 507

Clinical and Laboratory Suggestions 508
1. Measurement of a Root Canal. 2. Adding a Tooth to a Partial Denture. 3. Esthetic Protection for a Three-quarter Preparation. 4. Removal of Amalgam Restorations. 5. Resurfacing an Arkansas Stone. 6. An Aid in Seating a Casting.

The Editor's Page 510

Contra-Angles 516

Medicine and the Biologic Sciences 511

About Our CONTRIBUTORS

Following his distinguished tour of duty in the Army Dental Corps at Walter Reed Hospital, ROBERT M. APPLEMAN, D.D.S. (Ohio State University, 1927) became an Associate Professor of Prosthetic Dentistry at the Zoller Memorial Dental Clinic of the University of Chicago. In March, 1948, Doctor Appleman published in *Oral Surgery, Oral Medicine, and Oral Pathology* under the title "Rehabilitation of Progressive Hemiatrophy of the Forehead."

ARTHUR H. SCHMIDT, D.D.S., (University of Nebraska, 1920) has been teaching prosthetics at the University of Nebraska since he graduated from that university. Doctor Schmidt's article in the current issue, PLANNING AND DESIGNING PARTIAL DENTURES, is the second installment of a series of four.

STEWART EVERSON, B.A., (Occidental College, 1939); D.D.S., (University of Maryland Dental School, 1942) is an oral surgeon who cooperates closely with prosthodontists. Doctor Everson's last appearance in DENTAL DIGEST was in February of this year. His present article, POSTEXTRACTION ALVEOLECTOMY AND ALVEOLECTOMY FOR IMMEDIATE DENTURES, describes in detail the method he has employed most successfully where an alveolectomy is indicated.

MELVIN LIONEL MOSS, A.B., (New York University, 1942); D.D.S., (Columbia University, 1946) and his collaborator, Doctor James W. Thomason, have recently returned to personal practice of general dentistry after a period of time spent in military service. The case reported, RESTORATION OF FACIAL CONTOUR WITH PLUMPERS, is particularly interesting because of the definite improvement in the patient's social adjustment, as well as in his comfort, that followed the treatment Doctor Moss has outlined.

EDWARD J. RYAN, B.S., D.D.S., Editor
708 Church Street, Evanston, Illinois

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See second cover D.D.10

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See pages 436-37 D.D.10

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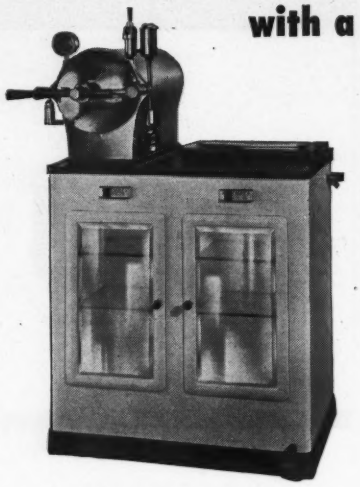

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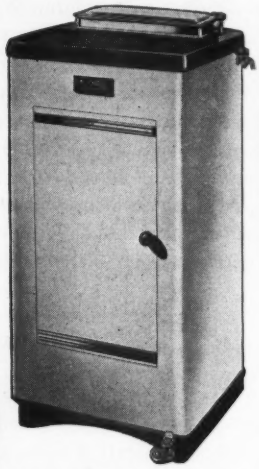

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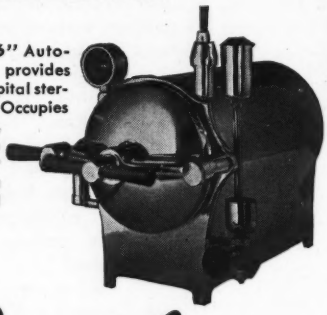

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